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ABSTRACT

Background information on and plans for the use of contemporary technologies at North Iowa Area Community College (NIACC) are provided in this report. Part I begins with a discussion of the integration of contemporary technology in business and industry; describes NIACC's contemporary technology strategic planning initiative; and gives an overview of NIACC's updated proposal and plan for contemporary technology. After analyzing the impact of robotics and computer technologies on the manufacturing industry and the implications for NIACC, part II describes the present status of and plans for NIACC's programs involving manufacturing technology. Part III reviews plans for expanding business technology, focusing on the college's ability to provide educational opportunities for students; office and microcomputer technologies; curricular applications; students to be served; and long- and short-range plans for the future. Part IV discusses the expansion of technology in the humanities, including an analysis of the current use of the computer laboratory in the Independent Study Lab and an overview of a three-phase plan for increasing technology. Part V begins with a discussion of the impact of technology on agriculture and its implications for NIACC, followed by an analysis of the present status of the agriculture curriculum and future plans. Part VI focuses on updating instructional support systems technology, analyzing technological influences on the field, their implications, the current status of media services, curricular applications, and plans and curricular applications for projection technology and graphics production. Finally, part VII provides a summary and part VIII presents 33 references. (LAL)

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... An Updated Plan
for NIACC'S Future

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NORTH IOWA AREA COMMUNITY COLLEGE

AN UPDATED PROPOSAL AND PLAN
for
CONTEMPORARY TECHNOLOGY AT NIACC

Presented to

Dr. David Buettner, Superintendent
and
the NIACC Board of Directors

by

The Contemporary Technology Task Force
Dr. Alfred R. Hecht, Chairman



May 20, 1986

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PART I

UPDATING NIACC'S PLAN FOR CONTEMPORARY TECHNOLOGY

An Overview of the Integration of Contemporary Technology in Business and Industry

Our 1985 proposal and plan illustrated how the growing use of contemporary, computer-based technology is changing how America conducts business and is changing how and what college students learn.(1) Rather than provide additional examples which show that such applications are continuing at all levels, this section will describe and illustrate "integration" as a unifying concept underlying contemporary technology.

Whether the term is used as part of the phrase "Computer Integrated Manufacturing" (CIM), is relabeled "network" as in "Local Area Network" (LAN), or is used as part of an "alphabet soup" of related acronyms, conceptually, "integration" retains its dictionary definition as "the act or process of uniting the parts to form into a whole."(2) However, as a technological concept, "integration" has short-term and long-term aspects, equipment and people aspects, and horizontal and vertical aspects. For example, in a recent article on CIM, Slattery identifies short-term integration outcomes as linking "inter-related functions as sales, design, materials management and handling, production, and quality assurance while providing valuable data for cost accounting and MIS (Management Information Systems) data bases."(3) Longer term, Slattery contends that:

"CIM will be the backbone of the totally integrated corporation. It will interact with such top management functions as financial planning and marketing and such heretofore routine functions as order entry, maintenance, shipping, and receiving. And, it will increasingly influence...human resource planning and administration."(3)

The horizontal and vertical aspects of integration are most easily grasped by considering existing examples. As shown schematically in Figure 1, horizontal integration links all manufacturing elements from design (CAD) through assembly and quality control with all office functions such as order entry, inventory control, and accounting. According to Edson Gaylord, CEO and Chairman of Ingersoll Milling Machine Company, design and implementation of the system shown in Figure 1 has given Ingersoll its "most important immediately available competitive edge."(3)

In contrast to horizontally linking all of the activities across an individual firm, vertical integration links the separate firms involved in each stage of a chain from processing raw materials to merchandising the finished product. Figure 2 illustrates vertical integration in the apparel industry. In an article in the March, 1986, issue of Women's Wear Daily, Sharp reports that the apparel industry is developing on-line computer networks to link fabric mills with apparel manufacturers and apparel manufacturers with apparel retailers to permit rapid sharing of important data from link to link of the apparel pipeline. In the same article, Thomas O'Gorman, President of Greenwood Mills, predicts that the survivors of the American fashion manufacturer's war against foreign imports will be those firms who can best adjust to a new concept of domestic teamwork.(4)



Figure 1
Horizontal Integration of Ingersoll Milling Machine Company



Figure 2
Vertical Integration in Apparel Industry

Technological integration requires sophisticated equipment and creative and skilled people. In regard to equipment, integration requires computers, terminals, printers, plotters, controllers, robots, interfacing and linking hardware and software. However, as Slattery points out, "Strictly speaking, the computer does not integrate manufacturing -- humans do. More than any other large investment in a manufacturing company, CIM is based on people's brains and imagination."(3)

Historically, manufacturing has taken place in a corporate structure in which functions were performed by separate, stand-alone departments, each trying to function efficiently and reporting to a higher coordinating management level. As contemporary technology has emerged, the separate departments and functions are being computerized. Successful corporate integration, consequently, will require investment in personnel training and retraining in addition to investment in contemporary equipment and systems.

As the preceding examples illustrate, technological "integration" is a complex and challenging goal underlying considerable investment of business and industry. As education adopts contemporary technology, it follows the same pattern as industry. Separate departments and functions are computerized first. Continuing investment in staff training and retraining will accompany investments in equipment and networking systems. Integration of instructional disciplines is a long-term goal for education. To maintain vitality, education must make the necessary investments.

NIACC's Contemporary Technology Strategic Planning Initiative

As a result of the multi-year nature of the initiatives in our Three- to Five-Year Plan, the goal of NIACC's Contemporary Technology initiative remains to:

Eliminate all significant deficiencies between College educational resources and practices and commonly found equipment, procedures, or concepts in comparable educational or industrial settings.

To achieve this initiative, we must "provide for regular investment in the technological currency of the college."(5) Over 1985-86, as in 1984-85, our staff members in several disciplines have investigated contemporary technology trends, equipment, and educational applications in their fields. An overview of our updated plans and proposal is given in the next section.

An Overview of NIACC's Updated Proposal and Plan for Contemporary Technology

In 1985-86, expansion of contemporary technology started in 1984-86 has been explored by faculty members in the areas of Manufacturing Technology, Business, and Humanities. In addition, contemporary technology has been explored by Agriculture faculty and instructional support systems staff. The next five sections of this proposal present the results of the investigations of each of these groups in the order named above.

Each of these sections includes a proposal and plans for expanding or updating our technology in that area. Each proposal and plan includes a description of our present status in that area, presents a 1985-86 proposal for updating that technology, and provides a description of future plans for updating and expanding technology in that area. The proposal portion of each section describes the criteria used to select the computer-related equipment requested, a description of that equipment, an estimate of costs involved, the curricular applications of the equipment, an indication of the credit and non-credit students to be served with the equipment, and the intended location and arrangement of the equipment. The proposal and plan concludes with a summary and a recommendation that the Board of Directors authorizes expenditure of sufficient funds to enable the College staff to implement the next steps in this initiative.

PART II

EXPANDING MANUFACTURING TECHNOLOGY

Impact of Technology on Manufacturing and Implications for NIACC

This year, the Robots 10 Exhibition in Chicago again featured the Assembly Robot, but no longer in a starring role. Instead, devices operating in concert were highlighted; and a choir of specialized machines working in harmony were the featured performers.(1)

Integrating robotic applications was not only the theme for Robots 10, it was also the central strategy of an increasing number of robot manufacturers. Many believe that the future belongs to those firms with the ability to supply complete manufacturing systems, not just robots. The show's theme points out the essential role of robotics technology in industry's movement toward integrated manufacturing.(2) "Our recent transition from being a robot manufacturer only to becoming a leading manufacturer of a wide range of computer-integrated manufacturing (CIM) and flexible automation products has led to a new name for our company: American Cimplex Corp.," said Romesh Wadhvani, its Chairman and CEO.

The Robots 10 Exhibition was just one of many conferences the instructors of the Manufacturing Technology Cluster attended. In accordance with the recommendations of Chasen and Dow, staff members traveled nationwide to assess recent industrial and educational developments relevant to vocational training programs.(3)

Upon their return, they organized themselves as the Manufacturing Technology Modernization Committee in order to share and assess what they had learned during their visits. They examined current trends and future needs and their implications for existing and potential programs at North Iowa Area Community College.

While much has been written about the infusion of robotics into manufacturing industries, the Manufacturing Technology Modernization Committee wanted a program that would be directed toward diverse, lifelong employment possibilities rather than one that would limit employment opportunities to a singular field such as robotics.(4) They formulated a proposal that included modifications to existing electronics and industrial electricity programs and the creation of a new program in Automated Systems Technology.(5)

In the proposal, the committee explained that the Automated Systems Technology program would train students in the electro-mechanical skills necessary to install, maintain, program, troubleshoot, and service high technology systems found in computer-automated manufacturing facilities. To accomplish this training, the Committee designed a program that would encompass curriculum dedicated to topics related to material handling, forming, shaping, assembling, and testing in product or process industries.(5)

On March 25, 1986, the NIACC Board of Directors unanimously approved these program recommendations. The implementation of these program designs will bring NIACC closer to its long-range goal of fully integrating its manufacturing training options with its business training options to bring about a Computer Integrated Manufacturing system.

Computer Integrated Manufacturing, the single most important advancement in manufacturing today, provides American industry with the key to becoming more competitive in world markets. CIM has the capacity for integrating such interrelated functions as sales, design, materials management and handling, production and quality assurance while providing valuable data for cost accounting. (See Figure 1.) Under computer manufacturing control, the machines will be linked not only to other machines but to all related support groups including design, materials handling, assembly, and packing and shipping.(6)

Over the next decade, manufacturing companies in North Iowa and across the nation will be automating their factories at a rapid rate to provide a link between their factories and offices. During this period, the composition of manufacturing jobs is going to change drastically. The jobs that today involve direct production of the product will give way to service type jobs that will involve design, installation, adjustment, troubleshooting, and maintenance of the automated systems.(7)

NIACC's program modifications will anticipate this change by providing technicians with a background in automated systems. Since every automated system consists of a control, power drive, sensor devices, and a mechanical system, students will be educated in each of these areas. Programs will include electricity; electronics; fluid power; programmable controls; servo controls; transducers; robotics; CNC machine tools; material transfer devices, such as conveyors; and central computer-integrated manufacturing systems.

Because NIACC's goal is to provide training programs that will prepare students to work in these efficient manufacturing systems that minimize inventory and maximize machine usage, all phases of modern manufacturing processes will be integrated into the training programs at NIACC.

The Manufacturing Technology Cluster, as a reorganized group of programs with an industrial atmosphere, will allow related groups to work efficiently with each other while maintaining necessary separations of manufacturing operations. The Cluster will cover centers of common industrial training and education, including materials, equipment, and personnel.(5)

Our Proposal and Plans for Manufacturing Technology

Present Status. Shortly after board authorization for the purchase of a computer-aided design (CAD) System, the College issued an order to PSI Systems Corporation for hardware and software. During the week of July 1, 1985, a PSI representative delivered and assembled an updated version of the recommended system in a modified arrangement of the original layout. As a part of that week, the representative conducted a two-day training session for the drafting and engineering instructors.



FIGURE 1. INTEGRATED CAD/CAM SYSTEM

Due to the complexity and unfamiliarity of the equipment, an instructor was chosen as the system-manager and was retained for a month during the summer to become familiar with the system and accomplish the following objectives:

- Establish rapport with the company,
- Receive advanced training on and about the system,
- Develop and configure the system so that it would be operational and capable for immediate student use when the fall term commenced,
- Be a resource person and troubleshooter for the other instructors.

Because the capability of the new CAD system far exceeds that of the older MATC CAD system, the use of the computer for drafting has increased dramatically. With the CAD, students are able to execute more complex and practical drawings than they could with the MATC CAD. While freshmen spend about 10 percent of class time working on CAD drawings, sophomores devote nearly 40 percent of their class time to CAD.

Before students can benefit from using CAD, they must be competent at the drafting board. Therefore, Mechanical Technology students move through a methodical learning process before the experience they support of the CAD system. The student approaches the new CAD system only after working with the more elementary but excellently revised version of the MATC CAD, which serves to introduce the student to computer drafting through a 2-D system. After reaching competency in 2-D, the student then trains on the 3-D CAD to master the versatility and capability of that system.

Since most of the instructional problems developed for the drafting board can easily be converted for use on the CAD system, students have completed many such drawings this year. Although the use of the 3-D CAD has increased students' use of CAD for such drawings by about 10 percent, that percentage will probably decrease as more students seek access to the CAD computers.

Using the system's symbol menu and schematics, Electronics students have also taken advantage of the versatility of the 3-D CAD system to develop circuit component layouts and circuit board designs; and they have used the systems color-layering capability to good effect in this work. They have spent approximately 15 percent of their class time at the computers.

In addition, 18 Pre-Engineering students have practiced introductory lessons in 2-D and 3-D drawings. These activities occupied approximately 10 percent of their class time, a percentage that meets or exceeds the requirement of state universities' curricula.

The instructor of our transfer Engineering Graphics courses has received notice from Iowa State University's (ISU) Department of Freshman Engineering that students who transfer in the fall of 1987 will face strict computer-graphics requirements and that transfer courses must be certified as equivalent before ISU will accept them. Since NIACC's CAD system is equivalent to ISU's, there should be no problem with certification.

Several evening courses in the use of the 3-D system have been offered by the College. Of the four courses offered, the one offering college credit did not attract enough students to make a viable course, despite extensive publicity and mailings to former students.

The evening courses that were held enrolled 19 employees from five local industries. These courses included both beginning and advanced courses in the 2-D and 3-D aspects of the CAD system. The enrollment for each 24-hour course was restricted to practicing drafters.

While we are pleased with the number of students using CAD this year, we expect the numbers to increase as potential students become aware of its use at NIACC. The day program enrollment served by the 3-D CAD system reached 90 percent of that projected in the 1985 Contemporary Technologies proposal while the evening program reached 64 percent of its projected enrollment.

Equipment Selection. Because contemporary equipment is a critical component in the Manufacturing Technology Modernization plan, NIACC will strive to take full advantage of existing equipment in new and modified curriculum areas.

The existing Electronics/Ag computer lab in McAllister Hall, Room 110, houses 12 Apple IIe computers and two printers. In order to utilize existing equipment effectively, the Ag department is proposing to use two Apple IIe computers and one printer in addition to its new Compaq system.

While the Electronics program is moving toward more use of IBM-PC, the Electronics instructors have requested that four of the Apples be dedicated to robot arms in the "Computer Programming and Control" course. They would also like to maintain two other Apples as "floaters" that would interface with programmable controllers and other automated systems.

The remaining four Apple IIe computers and printer could then be moved to Room 104 to extend the Nursing Department's access to computers.

The first phase of the new equipment acquisition which will accompany the first phase of program modification will eventually lead to a CIM system.

With that goal in mind, the Committee set the following criteria for the selection of Phase I equipment.

- All foundation and application course system should have a commonality of function and operation.
- Foundation systems courseware (instructional materials) must provide information that will enable the student to understand basic principles and to use them in problem-solving applications.
- All machines, robots, conveyors, and software within the manufacturing system will be able to communicate with each other to provide a totally integrated working system.

- All robots, machines, and conveyors must be industrial-performance-type systems and must be supported by courseware. Courseware will include texts, lab manuals, and instructor guides. Such courseware will allow for expeditious implementation of program designs at minimal costs. In addition, courseware will include maintenance procedures as an extension of the foundation courses and systems.
- All robots, machines, conveyors, software, and courseware will reflect **state-of-the-art** commercial industrial processes.
- All robots and machines shall be considered medium- to small-sized industrial systems commonly referred to as "first-line-production machines."
- Application work cells shall contain supporting lab courseware that address varied automated processes: welding, spray painting, testing, inspection, CNC tool unload/load, assembly, fastening, gluing, etc.
- The CIM software system will allow a central computer to control the entire flexible manufacturing system line. The software will include on-screen graphic display of the process with statistical data, off-line programming of all devices, process flow planning, archiving of parts programs for later automatic download to line, cost accounting, and estimating.
- All robots, machines, and training stations shall include, as part of the purchase, enrollment of NIACC instructors in factory schools to prepare faculty members in these new or expanded areas.
- Every effort should be made to ensure that equipment is compatible with NIACC's PSI CAD/CAM units so that manufacturing can be initiated and monitored through this system in the future.

Using these criteria, the Manufacturing Technology Modernization Committee recommends the purchase of the following equipment during Phase I:

	<u>Description</u>	<u>Unit Cost</u>	<u>Total Cost</u>
3	Gould, Modicon Micro 84 series, programmable electronic controller training station, with fault insertions and courseware. Lab-Volt, Model #3220	3,200	9,600
1	Laser Bar Code Reader Amatrol, Model #86-105	2,500	2,500
1	Hydraulic Servo Robot Arm, Amatrol Centari 6, Model #830-HR2-R6, including courseware	24,349	24,349

1	Robot Controller, 6 Axis, Amatrol, Model #829-CC6	21,769	21,769
1	Teach Pendant (Smart Terminal) with mounting stand, Model #825 TP	1,776	1,776
1	Robot Program Compiler Disk (Licensed), Model #827-RPC	350	350
1	Robot Arm Mounting Stand, Model #83-112	495	495
1	Servo Robot Control Mounting Stand, Model #83-114	368	368
1	Hydraulic Power Supply, Model #79-323S	1,195	1,195
1	Pneumatic Non-Servo Robot Arm, Amatrol, Mercury Model #830-PR1-C4 including courseware	4,995	4,995
1	Robot Control and Programmable Electronic Controller Training System, Model #822-PEC, includ- ing hardware and courseware	3,795	3,795
1	Workcell Station, Model #83-203	1,495	1,495
1	Mercury Multi-Task Workcell Tooling Station, Model #2-II-J	3,545	3,545
1	Hydraulic Non-Servo Robot Arm, Amatrol Hercules, Model #830-HR1-C5, including courseware	10,495	10,495
1	Robot Control and Programmable Electronic Controller Training System, including hardware and courseware, Model #822-PEC	3,795	3,795
1	Hydraulic Power Supply, Model #79-323S	1,995	1,995
1	Flexible Manufacturing line, conveyor loop with 3 off ramps Amatrol, Model #860	15,996	15,996
1	Controller for computer control system compatible with MAP (Manufacturing Automation Protocol), Amatrol, Model #822-PEC-AS	4,800	4,800

2	Computer interface control with software for integration of existing Apple IIe computers, Amatrol, Model #824-I/O	2,100	4,200
1	Bench top CNC milling/drilling machine, Dyna Electronics, Inc., Model #2400, including all hardware and software plus conversion package for G codes	11,700	11,700
1	Bench top CNC Lathe, Dyna Electronics, Inc., Model #3000, includes hardware and software plus conversion package for G codes	13,450	13,450
1	Logic Analyzer, Textronix, Model #338S-1, with 4-6451 Probes, courseware and RS-232 cable	7,140	7,140
TOTAL			149,803

While other institutions in Iowa, Minnesota, and Nebraska have robotics programs, NIACC's concept of a total Automated Systems Technology program is new to the area. Although programs at Hawkeye Tech, DMACC, Indian Hills, and Iowa Western all utilize some form of Amatrol or Lab-Volt equipment, either for robotic or fluid power instruction, NIACC, with its new curricula and proposed equipment will be able to deliver a broader-based program, giving students an opportunity to integrate all equipment into a manufacturing process through the use of the flexible manufacturing line. NIACC will be the first Iowa community college to offer students this opportunity.

Curricular Applications. Local industrial leaders have placed special emphasis on the development of educational programs to accommodate Automated Systems Technology. Presently, Electronics and Electricity instructors teach pneumatics and hydraulics primarily from textbooks. Now, these programs, as well as the Automated Systems Technology Program, will benefit from hands-on experience with the hydraulic-pneumatic training stations recently authorized by the Board.

Automated systems include one or more of the three types of robotic devices: hydraulic, pneumatic, and electric. The most commonly used are hydraulic and pneumatic, although electric devices are gaining in popularity. When studying and working with robots, students would study those three types of devices. Table 1 shows the proposed equipment's relationship to courses.

Because students need to be familiar with the new dimensions industry has with a flexible manufacturing line that couples units into a manufacturing process, they will work with robots as individual work cells or training stations or as parts of a process unit. The proposed programmable controller training stations, which switch, program, and operate units, can operate as stand-alones or as control units of an automated system and its flexible manufacturing line.

TABLE 1
Use of Equipment in Manufacturing Technology Cluster

Courses	Hydraulics/ Pneumatics Training Stations	Robots	Prog. Logic Controllers	Flexible Line
91:118 Comp. Program & Controls		★	★	★
91:281 Microprocessors		★	★	★
91:215 Digital Electronics			★	
90:135 Basic CAD/CAM		★	★	
91:111 Troubleshooting Tech.	★		★	
91:112 Test Equipment & Procedures	★		★	
91:119 Instrumentation	★	★	★	
92:116 Basic Machine Systems	★	★	★	
92:118 Fluid Power	★	★		
91:216 Machine Systems & Controls	★	★	★	★
91:218 Interfacing		★	★	★
92:218 Adv. Fluid Power	★	★		
92:223 Robotics	★	★	★	★
92:224 Automated Systems	★		★	★
92:225 Work Cell Integration	★	★	★	★
92:226 Servo Mechanisms	★	★	★	

Students to be Served. Based on current enrollment levels in Manufacturing Technology programs, we project, as shown in Table 2, that, with the new equipment, we will initially serve about 80 students per year. As we implement and publicize the proposed modification and expansion, this number should increase.

Location and Layout. Figure 2 shows the integration of equipment into a flexible manufacturing line. This proposed layout includes an inventory retrieval storage system which selects raw materials and places them on line for processing that may include machining, assembling, and inspecting. It, then, removes and stores the finished product.

Future Plans for Manufacturing Technology

As Phase I equipment is introduced into the Manufacturing Technology Cluster, NIACC will continue to move toward a total CIM system. Present plans put us on target with last year's Contemporary Technologies proposal. This 1986 fall semester, we will be able to put into action an automated systems lab with support labs (hydraulic and pneumatic), robots, and a flexible line.

As the systems are further developed, control units such as the CAM (Computer-Aided Manufacturing) system in the mechanical design area can be used to control product design.

Students will then be able to design unique products for which they will need to create appropriate software programs. In addition, they will be able to select and place robots in an efficient flexible line configuration in which they will plan to meet the demands of the product and process.

These later expansions will integrate NIACC's CAD/CAM system into the flexible manufacturing lines computer network. This network computer control system with appropriate data-acquisition-sensing equipment will operate to control the flexible manufacturing line involving several related manufacturing functions and, also, to track, record, analyze, and report status and manufacturing results through appropriate communication links.

Phase II of equipment selection and acquisition will move the programs further into machining processes and expanded robotic functions.

A working Automated Systems laboratory includes various robots and a flexible line, which includes equipment capable of performing various tasks. Lathes, machining centers, mills, and presses will be included, along with applications for welding, spraying, testing, inspection, assembly, fastening, etc. Those involved with the Automated Systems laboratory will continue their investigation into robotic guidance systems which will integrate machine vision and controllers. All future inspection, verification, and guidance tasks will utilize robotic vision.

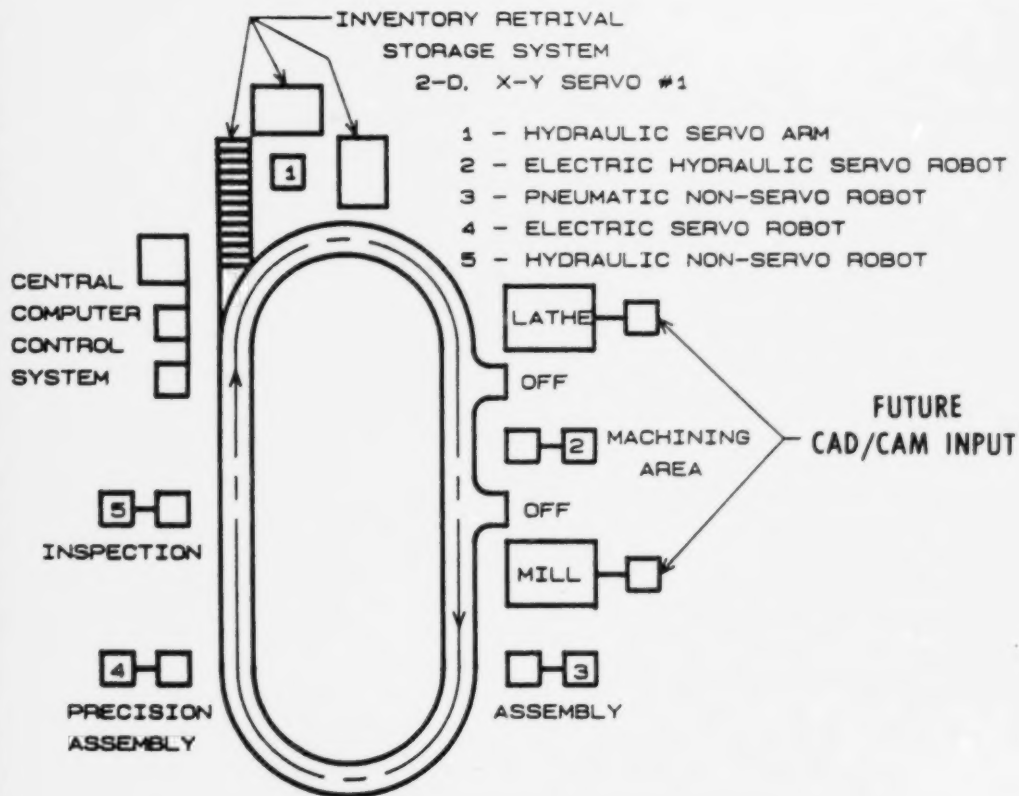
As the system develops and expands, its utility for students in other programs will grow. Those from Welding, Pre-Engineering, and Power Mechanics programs will find many educational opportunities evolving from the equipment as they visualize, create, and operate this functional model.

TABLE 2

Students To Be Served By New Manufacturing Technology Equipment

		<u>PROJECTED</u> <u>ENROLLMENTS</u>		
		<u>86</u>	<u>87</u>	<u>Future</u> <u>Goal</u>
A. Manufacturing Day Programs				
[Credit]				
1.	Industrial Electricity	16*	18	20
2.	Existing Industrial Elec.	12*		
3.	Industrial Electronics	12*	14	20
4.	Automated Systems Tech.	16*	18	24
5.	Electronics Eng. Tech.	24*	24	24
6.	Mechanical Design	-	17*	20
7.	Welding	-	8*	12
8.	Pre-Engineering	-	35*	40
		<u>80</u>	<u>128</u>	<u>160</u>
B. Service Technology Day Programs				
[Credit]				
1.	Refrigeration A/C		18*	22
2.	Automotive		22*	36
3.	AG Power		14*	18
			<u>54</u>	<u>76</u>
C. Evening Classes				
[Credit]				
1.	Electricity			10*
2.	Electronics		15*	20
3.	Mechanical Design			10*
			<u>15</u>	<u>40</u>
D. Evening Classes				
[Non-credit]				
1.	Electricity			14*
2.	Electronics		15*	30
3.	Industry (Short Courses)		30*	60
			<u>45</u>	<u>104</u>
TOTAL		80	242	380

*Curriculum modifications in place



FLEXIBLE MANUFACTURING LINE SET-UP

FIGURE 2

DRAWN BY: D. BRANFOLD
DATE: 6-25-88

The model CIM system will provide students with a simulated modern manufacturing environment in which to study, design, program, monitor, troubleshoot, adjust, and perform maintenance activities.

Because the aims of the vocational modernization initiative include periodic updates in Manufacturing Technology, NIACC will continue to offer programs that prepare students to work in contemporary manufacturing settings. Contemporary technology will remain the foundation for the restructuring of the Industry-Related programs.

PART III

EXPANDING BUSINESS TECHNOLOGY

Our Proposal and Plans for Expanding Business Technology

Present Status. Board approval of the first Contemporary Technologies proposal enabled NIACC to provide students with the opportunity to use DECmate and IBM-PC computers and the most popular software available.

Office Technology. Over 100 students enrolled in the office programs have been served by the DECmate III computers purchased. These numbers may not sound impressive, but the amount of time students spend in this automated environment is impressive. Each student enrolled in the programs listed in Table 1 spends a minimum of 10 hours per week in MH-214: five hours in structured class work and five hours in required lab practice. The use of MH-214 is evident in the Table 2 figures obtained through two weeks of monitoring the number of students present each hour. These students work on a variety of word processing applications and use WPS, the DECmate word processing software.

While the present furniture and layout, shown in Figure 1, were adequate as temporary measures to allow use of the new equipment, we are redesigning MH 214 to create a contemporary office environment. The furniture, custom built by Fieldstone Cabinetry, Inc., of Northwood, Iowa, should be in place by the beginning of the fall semester. This newly furnished instructional setting, Figure 2, will attract students and provide them with experience in working in a realistic office area on state-of-the-art equipment.

Microcomputer Technology. While some students worked with the IBM-PC computers on campus, others used them in business and industry settings. While some took credit computer courses, others took non-credit courses. In all cases, the IBM-PCs proved to be even more valuable in the delivery of computer instruction than we had anticipated.

The IBM-PC lab receives such heavy use that students wait in the hall outside the lab to establish a priority for free computers. In fact, the lab has become one of the most popular rooms in McAllister Hall. That popularity is reflected in the figures recorded in Table 3.

Of course, this demand for access to the computer is a welcome problem because it indicates the increasing worth of the IBM-PC lab investment. However, the demand also denotes a need for more computers.

In addition to the computers in the lab, the Community Services Division currently employs nine IBM microcomputers and two IBM proprinters to satisfy business and industry needs for computer education and training. Since the computers were received in August, 1985, the Community Services "Traveling Computer" program has been involved in 19 business and industry, off-campus, computer training operations. In excess of 221 students received training in classes that generated over \$7,200 in tuition revenues.

TABLE 1

Current Programs and Students Served in MH 214

Program	Current Enrollment
Accounting Clerk	12
Clerical Receptionist	7
Nine-Month Secretarial	15
Executive Secretary	10
Nine-Month Secretarial	7
Medical Assistant	16
Optometric Assistant	15
One- and Two-Year Medical Secretaries	10
One- and Two-Year Legal Secretaries	14
TOTAL	106

TABLE 2

Two Week Record of Students Use of Room MH 214

Date	7:40- 8:40	8:50- 9:50	10:00- 11:00	11:10- 12:10	12:20- 1:20	1:30- 2:30	2:40- 3:40	3:40- 4:00	Daily Total
April 15	23	22	17	10	12	15	12	2	113
April 16	17	19	14	13	11	22	2	2	100
April 17	18	17	14	3	13	17	6	2	90
April 18	17	18	15	4	10	12	3	2	81
April 21	19	22	16	14	11	17	3	1	103
April 22	19	23	16	5	18	12	7	1	101
April 23	19	18	15	4	12	13	9	3	93
April 24	20	18	13	4	5	9	5	2	76
April 25	18	19	15	5	11	7	1	1	77

For the four **days** records were **kept** the week of April 15 through April 18 384 students used Room MH214 for a daily average of 96 students per day.

For the week of April 21 through April 25, 450 students used Room MH214 for a daily average of 90 students per day.

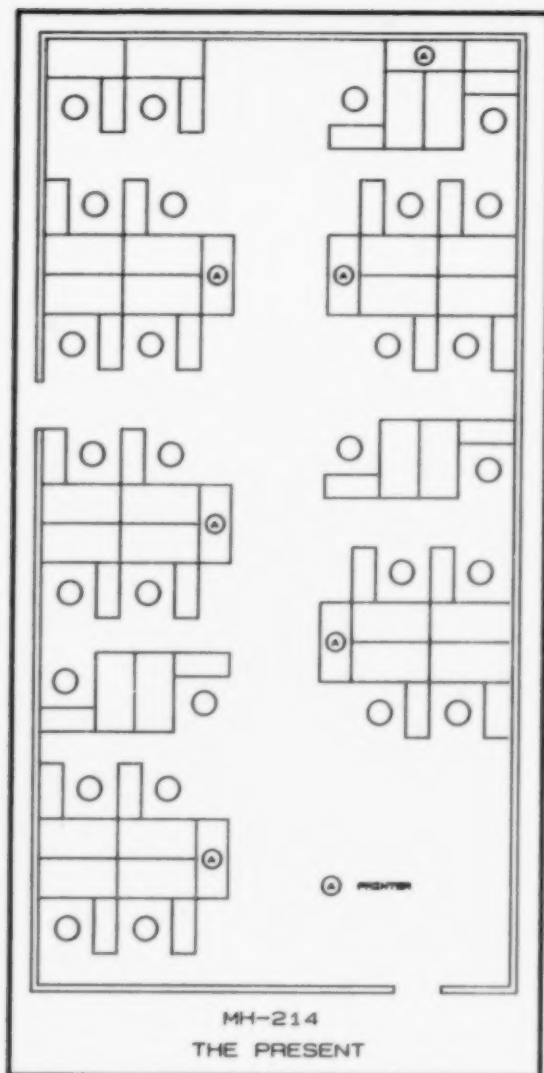


FIGURE 1

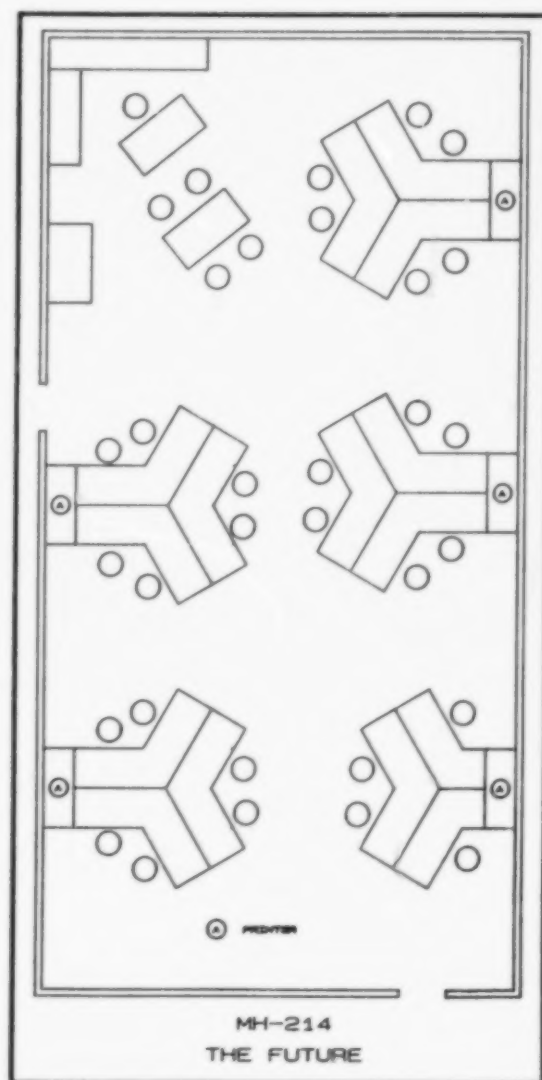


FIGURE 2

TABLE 3
IBM-PC Lab Usage

<u>Course</u>	<u>Number of sections</u>	<u>Total enrolled</u>	<u>Hours per week per student</u>	<u>Student hours per week</u>	<u>Lab hours needed</u>
<u>Fall Semester</u>					
Intro to Data Processing	8	348	6	2088	110
<u>Spring Semester</u>					
Intro to Data Processing	6	189	6	1134	60
*Lotus 1-2-3	2	38	2	76	4
*Wordstar	1	12	4	48	3
*Data Processing for Distribution	1	27	4	108	6
Cost Accounting	1	<u>9</u>	3	<u>27</u>	<u>1.5</u>
TOTAL		275		1393	74.5

Class meets in MH210

Furthermore, whenever the traveling computers were available during peak periods on campus, Community Services has placed the computers in the Business Division to alleviate the delays students faced in accessing computer time in the lab.

However, the following unanticipated problems have developed in the use of the IBM-PCs in the Traveling Computer program.

1. The bulky nature of the IBM-PCs makes them difficult to transport to off-campus locations.
2. The multiple components of the IBM-PC increase the amount of time needed to set up the units for the delivery of computer training.
3. Recent service repairs have made it evident that the IBM-PC computers were not intended for repeated transportation, assembly and disassembly, and other hazards of travel.
4. The number of computers available for transport severely limits class size. While we intended to have students double up on the computers, in post-training evaluations, students expressed a need for each individual to have access to a computer for the entire class time. However, with the present number of computers, any employer wishing to train many employees in a one-employee-to-one-computer ratio would find the cost of the necessary number of sessions prohibitive.

Equipment Selection. Because the IBM-PCs currently in use by the Community Services Division do not adequately meet the needs of that Division's off-campus training programs and because the need for additional IBM-PC's on campus is so acute, we looked for a solution to both problems. That search led us to a proposal for an economical solution.

We propose a permanent reassignment of the Community Services Division's computers to the Business Division to accommodate students who have had difficulty gaining access to the computers in the MH-210 lab, and we further propose the purchase of 10 computers designed for transport as replacements for Community Services' IBMs to meet the continuing need for business and industry computer training.

This solution would reduce the pressure on the IBM-PC lab, would provide students with additional access to the IBMs, and would enable the Community Services Division to serve business and industry more effectively.

With that solution in mind, we established the following criteria for evaluating microcomputer hardware and software:

1. The hardware and software should be widely used in local businesses and industries.
2. The equipment should lend itself to transportability.
3. The hardware should have a capability for upgrading.

4. The hardware should carry a widely recognized company name that would contribute to NIACC's prestige and leadership.
5. The hardware company should have stability, which insures continuing service and software support.
6. The hardware should permit easy and quick assembly as well as disassembly.
7. The hardware should have high resale potential.

On the basis of these criteria, the Compaq Model II Transportable Personal Computer was selected to replace the current IBM-PC systems in the Community Services Division.

Because the Compaq and the IBM-PC systems have the same keyboards and the same operations and run the same software, students may easily move back and forth between the two computer systems.

Cost estimates for the hardware, software, and peripherals for the Community Services' Traveling Computer program are as follows:

<u>Equipment</u>	<u>Unit Cost</u>	<u>Total Cost</u>
10 Compaq Portable Computers	\$1,908.00	\$19,080.00
4 IBM Proprinters	400.00	1,600.00
10 printer cable connectors	32.00	320.00
Software		1,900.00
TOTAL:		\$22,900.00

Curricular Applications. The microcomputer has become a major tool in the delivery of many courses both on and off campus. For example, courses in Mechanical Design, Engineering, Math, and Business all use microcomputer applications.

The addition of the 28 IBM-PCs to the Business Division and the Community Services Division, made possible through the first Contemporary Technologies proposal, has afforded increased use by students in course areas, such as Data Processing, Word Processing, Accounting, Programming, Microcomputer Specialist, and software instruction areas, such as Lotus 1-2-3, Wordstar 2,000+, Multiplan, and DisplayWrite III. In addition, the Community Services Division's Traveling Computer program has provided training projects for many North Iowa businesses and industries.

The transfer of the current traveling computers to the Business Division and the replacement with Compaq transportable computers for the Community Services Division will affect the curricula and students in several ways.

1. Presently, if Data Processing students were using the lab, they would only have access to a computer for four hours a week. However, they are not the only students required to use the lab. Therefore, the student/lab hour ratio is substantially lower than 1:4. With additional IBM computers, students will have more access time than is possible at present.
2. Students in the Traveling Computer program have complained that sharing computers detracts from the effectiveness of the training. With ten Compaqs, students may each have a computer.
3. With traveling computers available, NIACC will be able to address the growing needs of students in outlying areas by making the computers available in such areas as the Charles City Center, secondary school jointly administered programs, and the five-school project area, and to outlying business and industrial concerns whose employees need computer training and education.
4. Should the Business Division encounter peak, semester-end computer lab overloads, the traveling computers could easily be made accessible to on-campus students to relieve the temporary press.
5. At least three viable alternatives remain for the Compaqs in the event that the traveling program should outlive its usefulness. (1) They could be assigned to the Ag Department for use with their expanding computer applications. (2) Through library checkout, they could be made available to students, especially those whose family or traveling circumstances prevent the student from spending extended hours in on-campus computer labs. (3) Through Media Services checkout, they could be made available to faculty members for staff development and for curriculum planning.

Students to Be Served. As shown in Table 3, approximately 686 students enrolled in credit classes, along with a large number of students in non-credit courses, will have more adequate access to computers with the expansion of the IBM lab.

While 600 of these students are enrolled in Introduction to Data Processing, a course that requires students to use the computers extensively, another 86 must use computers for courses in Wordstar, Data Processing for Distribution, Cost Accounting, and Lotus 1-2-3.

In addition to students in credit courses, students are enrolled in a variety of Community Services non-credit computer offerings including Wordstar 2000, DisplayWrite III, Lotus 1-2-3, Basic Programming, Understanding DOS, and Introduction to the IBM-PC. All of these courses also require students to use the IBM computers.

Location and Layout. Figure 3 shows the proposed layout of MH 206C with the IBM-PCs in place. We choose to locate the additional IBM computers in MH 206C for two reasons: (1) No classes are scheduled in this lab area; therefore, students have access to the lab from 7:00 a.m. to 9:30 p.m., Monday through Thursday, and from 7:00 a.m. to 4:00 p.m. on Friday. (2) This room

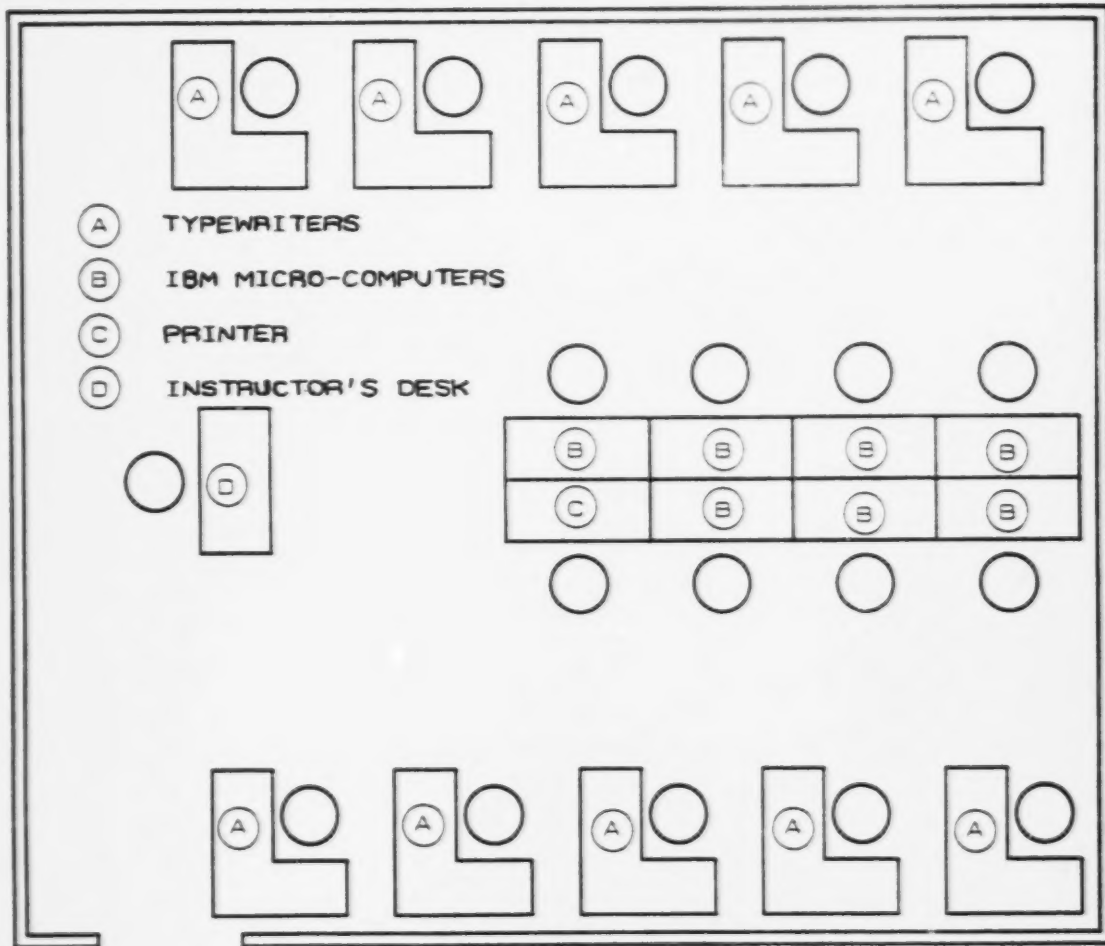


FIGURE 3
Proposed Equipment Layout for Room 206C

already houses typewriters, dictaphones, and calculators; with the addition of the IBM-PCs, MH-206C will become an even more attractive multipurpose lab for NIACC students.

Future Plans for Business Technology

The Business Division has organized its planning process into short-range planning and long-range planning.

Short-Range Planning. We will concentrate our efforts in the coming year on the following four areas which we began working on this year. These four areas represent opportunities to deliver instruction in more effective and efficient ways.

1. Increased cooperation between divisions in utilizing computer hardware and software - As evidenced in this proposal, the co-operative efforts between the Community Services Division and the Business Division have provided economical benefits for both Divisions and have enabled Community Services students to use the IBMs in the Business Division and have allowed the Business Division to borrow computers from Community Services during peak periods in credit courses.

Next fall, students in the Manufacturing Technology programs will enroll in Introduction to Data Processing as a part of their programs; and they, too, will use the IBM-PCs.

Therefore, by increasing the cooperation between Divisions, we have begun a more efficient use of our computers and a greater return on NIACC's investment.

2. Increased partnerships with business and industry through training and education - The availability of transportable state-of-the-art equipment and the opportunity for flexible scheduling enables area businesses to provide in-house computer training for their employees. Some of the organizations that have already taken advantage of this training are the Department of Transportation, the A. C. Neilsen Company, Salisbury Laboratories, and Franklin General Hospital.
3. Increased use of older computer equipment to deliver established curriculum - The Franklin 100 micro-computers, some of which were used in the initial Traveling Computer program, were moved to MH-211 and are being used by students in the Typing II and III courses and in a new course, keyboarding. At present, the Keyboarding instructor is designing individualized Keyboarding and Typewriting courses for an open-entry, open-exit office-occupation certificate program, which will attract additional students who will use the Franklins.

Use of these computers has afforded three benefits:

- (1) It has aided students in making the transition from conventional typewriter to computer.

- (2) It has provided students with a view of a computer keyboard while they learn keyboarding.
- (3) It has provided a more consistent delivery of Secretarial and Clerical programs as shown in Table 4.
- (4) It has relieved the pressure on aging typewriters.
- 4. Increased in-service for staff members to expand their knowledge and use of high technology - Having staff members who are properly prepared to provide computer instruction is a key element in the success of NIACC's commitment to provide students with education and training supported by contemporary technology. However, busy staff members need time and assistance to upgrade their skills in the use of available hardware and software.

While some time for computer in-service is available during Staff Development Weeks, staff members who can find time during the semester may be able to use the traveling computers in periods when they are not on the road. Computer accessibility and training for staff hold a high priority in our plans.

Long-Range Planning. In last year's Contemporary Technologies...A Plan for NIACC's Future, the Business Division introduced four points for future planning in each of two areas: Office Technology and Microcomputer Technology. The eight guidelines presented in that proposal have provided direction in the investigation of updating the use of technology in the Business Division.

Office Technology

- 1. Updating equipment in the secretarial/clerical classrooms in McAllister Hall - This update could include equipment from different vendors in a different configuration than we have in Room 214 of McAllister Hall to provide our students with as much experience as possible with different applications in this area.
- 2. Creating an information processing system at NIACC that could process all types of documents for all personnel at NIACC - This system could create, store, and retrieve documents. This center could be used campus-wide and could also be used by other segments of our market. It would provide office students in-house training in a job-like environment.
- 3. Creating an electronic communication network within the educational system at NIACC - This network, called telecommunications, would enable NIACC to use electronic mail, electronic dictation, and electronic filing.
- 4. Developing an integrated office system which will link all forms of office equipment such as word processors, graphics displays and printers, copiers, electronic data files, and transcription devices - This integrated system will transmit data from a common storage area within the College.

TABLE 4

Franklin Ace 1000 Utilization in MH 211 for 1985-86

First Semester - 1985

<u>Course</u>	<u>Number of Students</u>
15:104 Typewriting II	16
15:104N Typewriting II	6
15:105N Typewriting III	3

Second Semester - 1986

15:102 Keyboarding	20
15:104N Typewriting II	9
15:105 Typewriting III	20
15:105N Typewriting III	4

Summer - 1986 - Anticipated Enrollment

15:102 Keyboarding	20
15:104 Typewriting II	20

Total Enrollment	<u>118</u>
------------------	------------

These enrollments are expected to increase during the 1986-87 school year. Keyboarding (new course second semester 1985-86) is expected to be offered both semesters next year. The popularity in our area of using Format II (user friendly software) in Keyboarding, Typewriting II, and Typewriting III should help recruiting efforts next year in the office education area.

Our planning centers on the concepts of networking and information processing.

Networking systems and information processing systems are the primary components in information resources management. These two components must be in place to determine where information resides, who owns it, who has access to it, and who needs it. As the ability for electronically sharing all types of information grows, this information management approach will be increasingly important.(1)

Therefore, NIACC needs to plan for a networking system and an information processing system: the necessary components of an information management system. Because the chosen networking system must allow optimal upgrading, changing, and expanding over the life of the system, the selection of the system with the greatest flexibility creates a challenge in decision-making.(2)

As we began investigating information processing on campus, we found that a data base provides information used by Administrative Services, Admissions, and the Business Office through a networking system. However, the planning underway for an information resources management system in the Business Division is the first in an instructional area.

We have begun considering an appropriate place to begin and have tentatively decided to begin with a limited Local Area Network (LAN) in MH-211. We would modify the present arrangement, shown in Figure 4, to that shown in Figure 5 where one unit in each cluster of six terminals would serve as the control unit.

Future software applications in MH-211 would include accounting, electronic mail, electronic spreadsheets, data-base management, information management, and expanded word processing. These applications would, of course, be available to students from a variety of programs.

When the LAN is established in MH-211, the Franklin computers will be moved to MH-206D. Currently, MH-206D, as shown in Figure 6, is equipped only with typewriters. Once the Franklins are moved to that room, all Typing and Keyboarding classes will be taught in the efficient setting shown in Figure 7.

This tentative plan is just one more step toward an information resources management system made up of networking and information processing. This step would expand the concept into the instructional area; however, it should be only the first step and should be expanded beyond one room, one division, one building, and one campus.

Microcomputer Technology

1. Adding more microcomputer laboratories to accommodate increasing numbers of students and applications.
2. Enhancing the versatility with which computer training and education is delivered to business and industry via the Community Services Traveling Computer program.

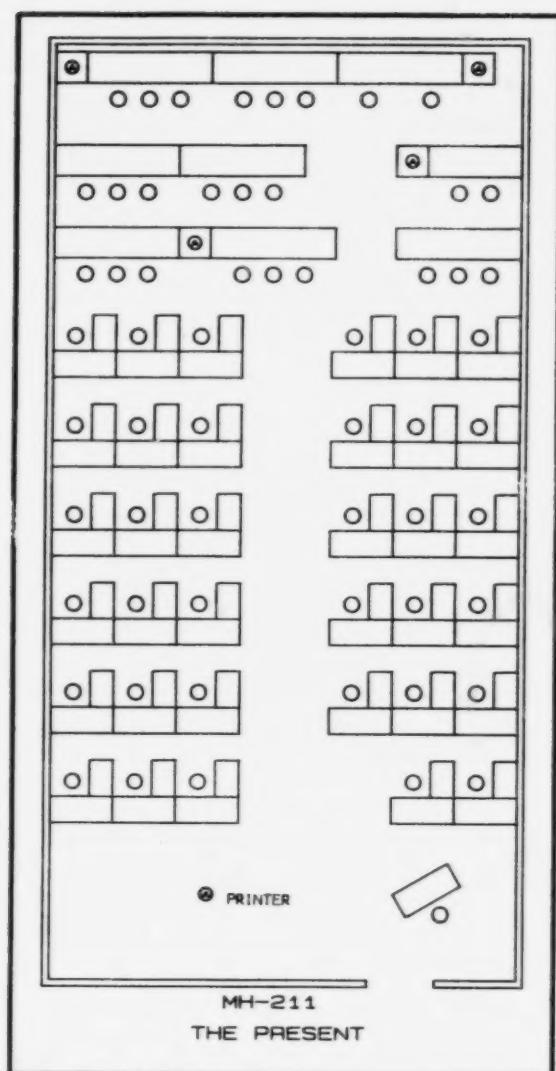


FIGURE 4

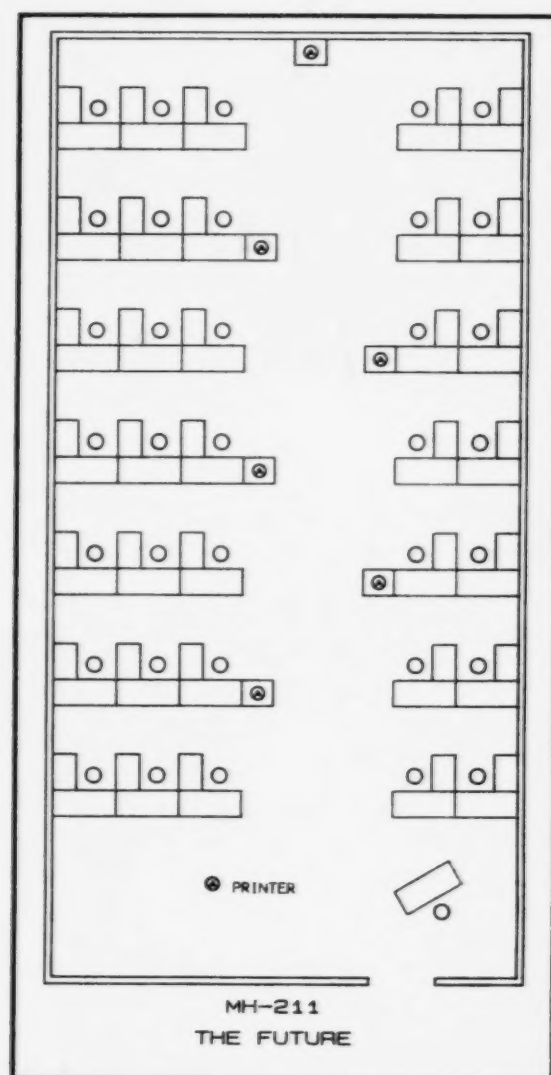


FIGURE 5

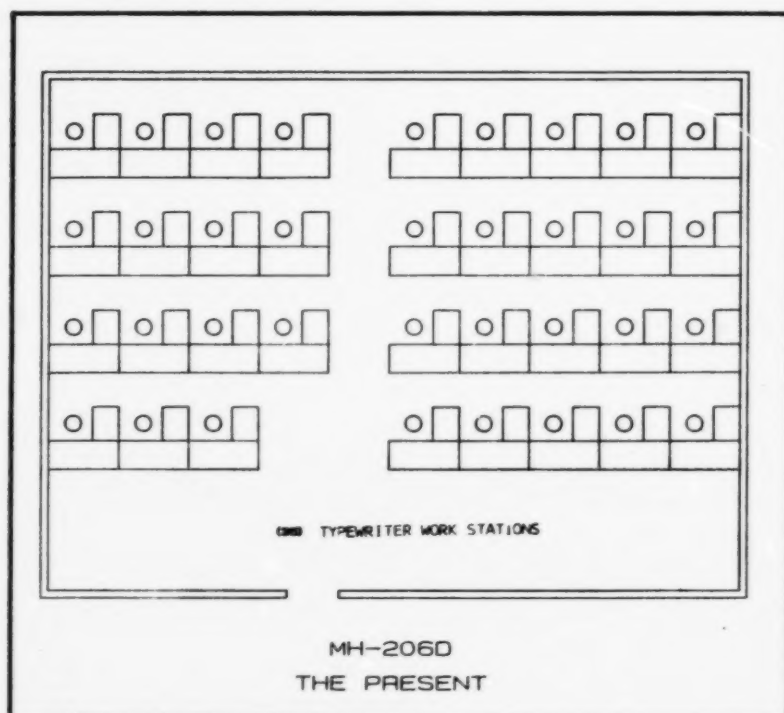


FIGURE 6

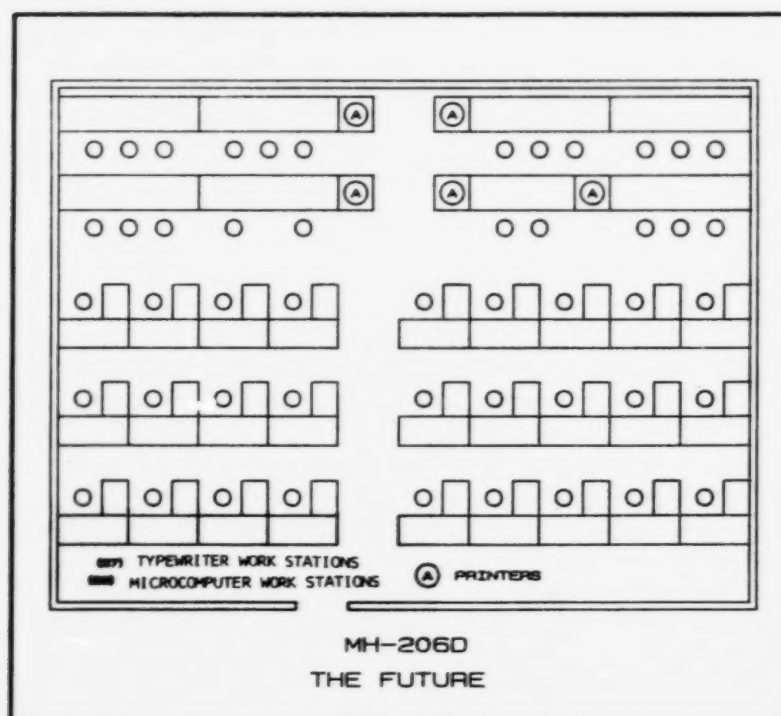


FIGURE 7

3. Increasing the variety of equipment manufacturers to provide students experience on several types of equipment.
4. Updating curricula to reflect changes in computer technology.
5. Networking micro-computers with other components of NIACC's information system to integrate word processing and data processing within and across disciplines. For example, business students may analyze CAD/CAM data for cost accounting and marketing purposes.

As we look toward networking, we know that we will have to find networking solutions that will connect computers with a variety of trademarks, some of which are presently incompatible. We believe that this multiplicity will be less of a problem in the near future as vendors have already begun to anticipate the market for networking systems. Vendors agree that networks must be flexible enough to accommodate different communication choices because single-vendor situations are rare today; therefore, networks must have the ability to make changes.(3)

We will need to network Digital, IBM, and Compaq (totally IBM-compatible). Two years ago, the data flow between DEC and IBM was negligible. Today, it seems to be growing in geometric progression. It is not uncommon for IBM users to log onto an IBM Personal Computer, cross IBM's System Network Architecture (SNA), and enter Digital's overall networking system (DECnet) before logging onto a VAX mini-computer where they are able to read and send mail.(4)

Not only are we looking at networking as a contemporary means of information resources management on campus, but also as a way of creating a link with the off-campus sites and with the traveling computers. Such networks would provide limitless possibilities for providing and accessing information and for providing data bases and system programs for business and industrial computer training and for the five-school project and the jointly administered secondary programs.

Although a great deal of work and many questions remain, doing that work and answering those questions are a part of our long-range plans, our continuing effort is to remain in the forefront in delivering educational opportunities for the people in our area. The progress we have made in just one year is noteworthy, but we must not become complacent. We must continue to move forward systematically.

PART IV

EXPANDING TECHNOLOGY IN THE HUMANITIES

Our Proposal and Plan for Updating Technology in the Humanities

Present Status. Shortly after Board approval of the 1985 Contemporary Technology proposal, the Humanities Division established a DECmate computer lab in the Independent Study Lab in Beem Center.

This lab has proven to be a very busy area. The DECmate IIIs have transformed many students' attitudes toward writing in a very positive way. Students who had previously dreaded writing assignments express a new-found pleasure in approaching those assignments with the aid of word processing.

In addition to the positive change in attitudes, instructors witness much more extensive and recursive revising and editing since students have access to the DECmates. Frequently, students who have made revisions on hard copies of their papers see additional needed revisions as they enter their planned revisions in their documents. In this way, word processing allows students another chance to review and reconsider their thinking and writing.

Of course, part of the credit for the increase in revising and editing must be attributed to students' access to Writer's Workbench. Even reluctant student writers often catch the spirit of challenge for improving the style statistics Writer's Workbench provides for their writing. It is not unusual for students to submit papers for analysis more times than their instructors require. Prior to each submission, of course, the student revises to improve those statistics. Most certainly, Writer's Workbench motivates and helps students to revise.

Furthermore, students enjoy the satisfaction of seeing each new version of their documents in clean hard copies.

Part of their pleasure stems from "messing up" clean hard copies with even more revisions since they are secure in their ability to print hard copies of their "even better" papers at the touch of five keys.

We agree with Ronald Sudol when he writes in College Composition and Communication:

"Moreover, when writers perform such activities (composing) in a room full of computers, rather than in solitary confinement, they form a community in which their work becomes a public act. This community of writers provides a nearly ideal setting for collaborative learning, enabling freshman composition courses to liberate students" (1)

As we prepared to describe the present status of the DECmate and Writer's Workbench use, we realized that we would have to use four types of information: present and planned student use required by instructors, a tally of computer use during one week, the number of times Writer's Workbench was run during first semester and the first half of second semester, and plans generated by research done during the 1985-86 college year.

By relating these three types of information, we have a valid perspective of present and projected use on which to base our proposal.

First, we gathered data on instructors' requirements for each day class and divided the second semester requirements by two because only half of second semester was completed when we solicited this information. The results indicate that those instructors who have not required student use of the computer systems now plan, after completing in-service training during May, to require student use next year. While some Career program students in Communications chose to use the systems this year, next year all Career students in the Communications classes will be required to use the DECmates.

These two factors alone would impose serious strains on the present DECmates, but those two factors are not alone as shown in Table 1; in addition, instructors who required one word processing paper this year plan to triple that number next year, and the Basic Writing instructor will double this year's number of students and papers next year.

Next, we monitored the computer lab from 7:50 a.m. to 4:00 p.m. for what turned out to be a slow week. We had hoped for a fairly typical week to determine the general use of the computers, but decided that the projections cast from the figures for a slow week were adequately disturbing. The week before the statistics in Table 2 were registered, from two to six students were waiting for computers at all times between 9:00 a.m. and 4:00 p.m. for three consecutive days. That press was the result of one instructor having a term paper due. The week after the statistics were gathered, 14 students were using DECmates at 8:50 a.m. on at least two days, and a greater number were working on the Computers every hour after that until 3:00 or 4:00 p.m.

Because writing assignments are not given daily but rather at times that are appropriate to the progress of each class or of each student, the use of the computer lab varies, not only within the hours of each day but also from week to week.

If a class of 26 students was watching a film in Beem Forum when a campus visitor entered, that person might judge, "NIACC certainly doesn't need 147 seats in this auditorium." Similarly, an observer entering the DECmate lab at hours when only a few of the computers are in use might think that the Humanities Division does not need so many computers. However, Beem Forum's capacity is often taxed by the numbers of persons in the groups meeting there. The same is true of the DECmate lab: During peak periods, the number of computers falls far short of meeting the demand.

When several instructors' assignments are due during the same week, students have to wait as much as 90 minutes for a computer to be free. What delays will students face next year when instructors require three times as many papers on the DECmates?

The projected total of papers requiring the use of DECmates and Writer's Workbench for next year is three times that of the current year. Those planned requirements for next year will triple the number of papers and, therefore, the amount of time that students will need to spend using the computers. However, instead of tripling the figures for the slow week, we multiplied them by only

TABLE 1
Current and Projected Numbers of Papers Requiring Use of DECmates

Number of Classes	Number of Students	Number of Papers Requiring DECmate	Total Num- ber of Papers Requiring DECmate 1985-86	Projected Number of Papers Requiring DECmate 1986-87	Total Pro- jected Num- ber of Papers Requiring DECmate
COMMUNICATION SKILLS					
20	405	0	0	1	405
14	283	1	283	3	849
8	324	6	1944	6	1944
COMMUNICATIONS					
4	30	2	60	4	90
14	194	0	0	4	776
BASIC WRITING					
2	24	3	54	5	180
			1985-86	1986-87	
			2341		6936

TABLE 2

Students Working in DECmate Computer Lab During One Week

TIME	DAYS				
	MON	TUE	WED	THUR	FRI
7:50	2	7	0	4	4
8:10	4	6	2	3	5
8:30	4	6	2	3	6
9:00	3	7	3	6	11
9:20	4	7	2	13	6
9:40	11	14	10	12	10
10:10	5	16	13	19	10
10:30	9	14	10	19	16
10:50	8	18	5	19	11
11:20	8	9	4	9	6
11:40	14	9	5	12	6
12:00	10	12	4	10	2
12:30	10	11	7	8	4
12:50	8	10	6	10	4
1:10	11	13	4	9	5
1:40	13	12	4	8	6
2:00	11	10	8	9	5
2:20	9	15	6	11	5
2:50	14	8	6	7	9
3:10	17	10	6	13	9
3:30	10	11	5	12	7
3:45	10	9	4	11	7
4:00	7	7	4	12	3

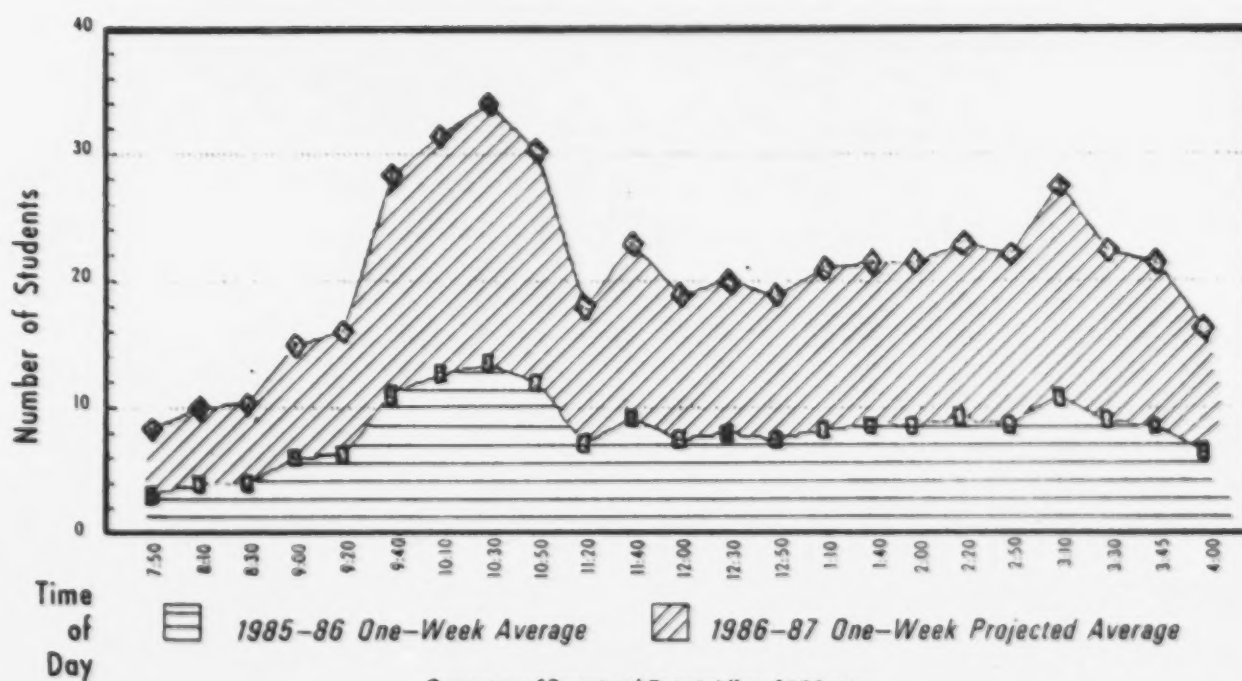


FIGURE 1

two and one-half to avoid any possibility of exaggeration. Figure 1 shows a graphic comparison between the numbers of students using the computers during the monitored week and the numbers projected for next year.

During peak periods of use, we have already experienced the delays caused by overload and the effects of those delays: complaints and poor student morale. This year's peak period could be exceeded by next year's daily load. We must prepare for that increased activity rather than react to the effects that the limitations of the present configuration would have on our students next year.

As the third part of our fact-finding process, we used ATECC's time-monitoring records to estimate that 9,500 Writer's Workbench analyses have been run during the first semester and the first half of the second semester. This figure indicates that students have run approximately four revisions of each required paper through Writer's Workbench or that students use Writer's Workbench on more papers for writing classes than required or that students are submitting papers for other courses for Workbench analysis. In March alone, students ran a total of 1,400 analyses; this figure for March suggests that the use of the system increases in proportion to the students' increasing familiarity with it.

However, these figures provide only a rough and minimal indicator of student demand for DECmate access because students use stand-alone word processing to compose and revise drafts before and following each Workbench analysis.

Therefore, probably the total number of versions of the documents produced by the system is at least two to three times the number of the analyses.

We know that instructors have assigned 2,341 papers for which they required the student to use word processing and Writer's Workbench. Yet we have a reliable estimate that 9,500 papers were submitted for Writer's Workbench analysis.

If students are processing even twice as many papers as they are submitting to Writer's Workbench, they are processing nine times the number of assigned papers.

Since peak periods, causing students extended waiting, occur with some frequency when writing instructors are assigning 2,341 papers for the system, we feel certain that students will face delays in accessing a DECmate almost every day when instructors are assigning 6,756 papers for the system. While the demands by writing students will triple, the problem will be magnified by students who continue to use the system when they are sophomores.

During 1985-86, Communications students, who are students enrolled in Career programs, were allowed to decide whether or not they wanted to learn word processing.(2) Only those Communications students who chose to use the computers used them. However, beginning with the fall semester, all Communications students will be required to use the DECmates.

That change will add from 125 to 175 students a semester to the already heavy demands on the available computers. Since students in Communications classes are enrolled in Career programs, they carry heavy class-hour loads and must, therefore, be able to use the word processors during their Communications class times.

The fourth factor in the analysis of our present situation has to do with our current and continuing consideration of ways of extending our use of technology to heighten the effectiveness of our teaching. Instructors of the individualized Communications courses are looking into moving from the highly successful, but time-consuming, handwritten memos in response to students' work, to a staff-designed electronic mail system.(3) Their students will, therefore, need to have access to computers to "pick up" the electronic mail. That need presents a problem in that the Humanities instructors, in ensuring all students an opportunity to use the computers, have agreed not to allow students to use the DECmates during the students' assigned class times.

With all of these possibilities for improving instruction and for serving students, it is easy to understand that some Communication Skills and Communications instructors feel that they have helped students to use technology more than they would have thought possible in one year with their own very limited experience with and with their own limited access to the computers. Yet, they are eager to employ programs that will allow them to work toward desirable collaborative learning and that will help them bring their students to greater success as thinkers and writers.(4) Moreover, these instructors need and want in-service training that will fit their individual needs and schedules without interfering with students' access to the DECmates in the computer lab. Furthermore, we all feel a need to have computers that we can move into our classrooms to use with a large-screen computer projector to help students learn to master the DECmates' capabilities and to learn to revise using Writer's Workbench analyses.

Our current status? Exciting, challenging, and brimming with opportunities for asking "What if?" OUR PROPOSAL FOR UPDATING TECHNOLOGY IN THE HUMANITIES "What if?" we asked ourselves. What if we could move closer to meeting the increased student demands for computers next fall? What if we could allow Career program students to use computers during their individualized Communications class? What if Communications instructors could utilize DECmates for information management and communication with their students? What if the instructors could have computers on wheels available on the second floor of Beem Center to enable large-screen projections for classroom presentations? What if instructors could interact at a convenient computer in intra-divisional, individualized in-service training?

Equipment Selection. "What if's?" led us to assess the minimum hardware and software that would enable us to maintain reasonable access in the face of increasing demands, that would allow us to let Communications students use computers during class time, that would enable Communications instructors to begin a basic form of electronic mail, and that would enable instructors more convenient access to computers for classroom use and for in-service training.

In an effort to meet these increasing demands, we first investigated other institutional resources. Despite its plans for offering several short-term programs on its DECmates, the Business Division offered to open its automated office lab to sophomores who wish to continue using word processing. These students would then return to the Independent Study Lab to transfer their documents to Writer's Workbench. Though this accommodation increases space and time for computer-literate students, it does nothing to address the expanding needs of freshman writing students.

Finally, we determined that we could, by coordinating our needs and efforts, approach our goals, that is, our answers to "What if?" by the careful placement of seven DECmates and a heavy-duty printer.

The following list covers the costs for updating computer technology in the Humanities Division.

Quantity	Item	Cost
7	DECmate III with wps (\$2,695)	\$18,865
1	Printer (Heavy Duty)	3,500
4	Interface and spooler (\$1,000)	4,000
5	Work Stations (\$200)	1,000
	Cables and Wiring	500
1	Noise Silencer	389
1	Printer Stand	200
TOTAL		\$28,454

Students Served. All students enrolled in Communications and Communication Skills classes taught on campus by full-time instructors would have access to the DECmates and the printer. Any other students who are literate in the use of this equipment would also be able to use it.

Location and Layout. As we searched for a creative way to use only seven additional DECmates and still approach an answer to all of our goals, we recognized that the location of each computer would be the key to our success.

Coupled with the increasing demands for access to the DECmates is the need for Communication students to use the computers during their class periods and to have computers very accessible in order to pick up their electronic mail. At the same time, all of the computers need to be available to all students.

Another element affecting the location centers on the instructor's need to use DECmates in classroom situations as a means of helping the students use the capabilities of the system and as a means of demonstrating ways of revising and editing in response to the analyses by Writer's Workbench.

The value and use of the entire system will be multiplied as instructors are able to interface the computer with a large-screen projector as another teaching strategy. However, this application requires that they have "computers on wheels" near the classrooms.

With that assessment of needs, we developed the following plan for location and layout of the equipment.

We need at least two more computers in the computer lab in the ISL to ensure reasonable access between 4:00 and 8:00 p.m.

The computers in the lab will be arranged as shown in Figure 2.

Since students in Career programs take Communications in The Communications Complex, an individualized setting, open from 8:00 a.m. to 4:00 p.m., we will position four DECmates on mobile work stations in The Communications Complex. While this arrangement will allow Career program students use of DECmates during their class periods, any student may use these computers. The individualized environment will not be disrupted by the coming and going of either Career or Arts and Sciences students. Furthermore, instructors will have easy access to move the computers to their second floor classrooms. The arrangement in The Communications Complex, Beem Center 214, is shown in Figure 3.

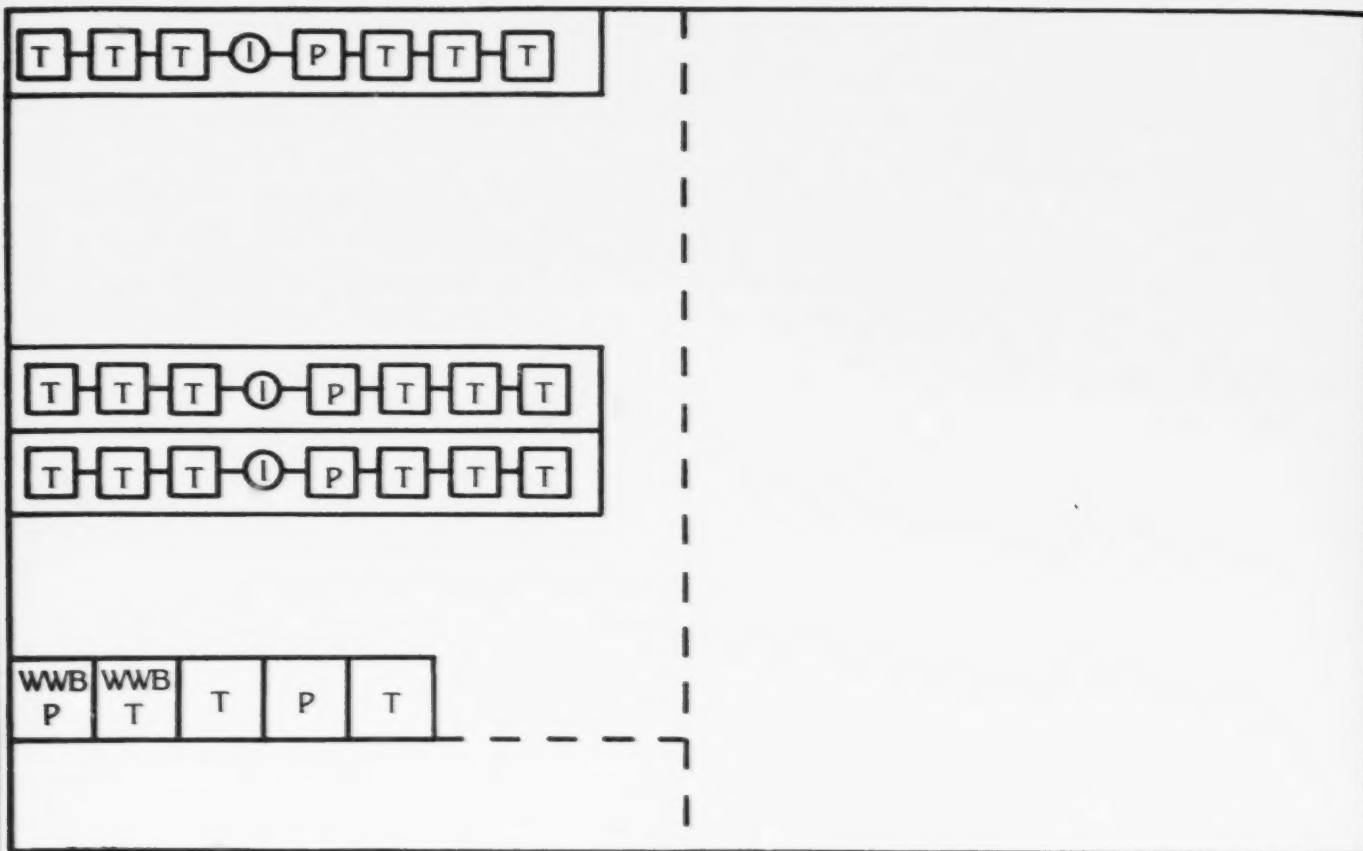
To provide for instructor in-service activities and materials preparation, the seventh computer will be located in the office of the Humanities Division Chair.

Future Plans for Using Technology in the Humanities

We see the use of technology in the Humanities developing systematically in steps we will refer to as phases. However, maintaining a number of computers that will allow reasonable student access will be a consideration in every phase.

Phase 1. With the purchase of additional work stations, Communications and Communications Skills instructors will move forward in the use of word processing and Writer's Workbench. The Communications instructors will begin using some form of electronic mail for students, and all instructors will be developing plans to use large-screen projections of procedures for using the DECmates and the Writer's Workbench analyses. And, as a part of this growth, writing teachers will use in-service time to heighten their computer skills.

As a part of the continuing examination of technological aids for the improvement of student writing, we have been exploring the use of DECTalk as another way of enabling students to accept responsibility for upgrading the quality of their final drafts. Interfaced with a DECmate, DECTalk reads the student's document exactly as it is written on the student's diskette.(5) In listening to DECTalk read the document, the student frequently hears problems in logic and construction that Workbench does not identify or that he or she has not thought needed revision: awkwardly constructed sentences, fragments, misspellings, and punctuation errors. Students who have had an opportunity to try DECTalk have responded by asking to listen to each document at least twice because of the benefit they realize in their editing and proof-reading efforts. Of course, the current demands on the DECmates would prohibit adequate access to DECTalk if DECTalk were available for all students.

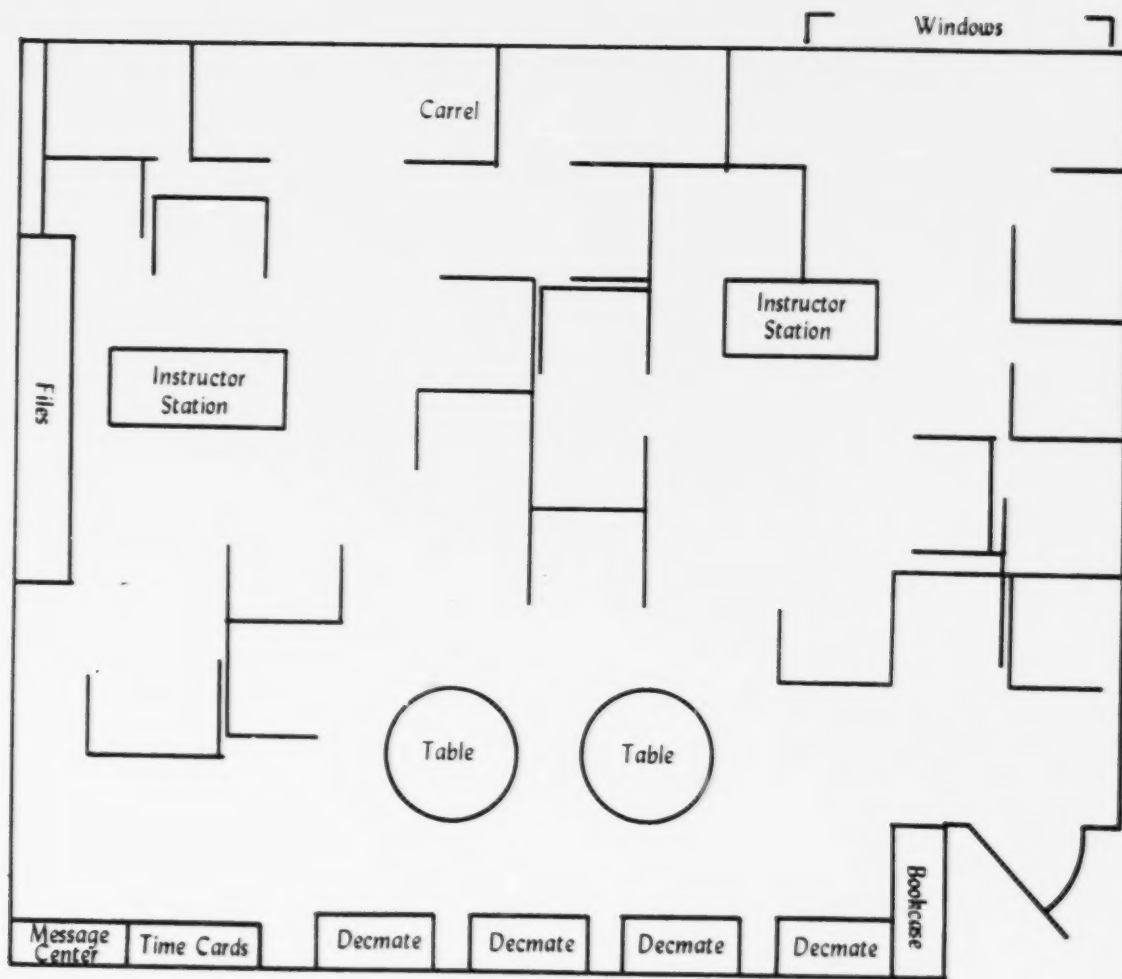


T = Terminal P = Printer I = Interchange

FIGURE 2

Proposed Configuration of Writer's Workbench Lab

BC 100



BC 214

FIGURE 3

Foreign Language instructors, who have already begun to develop course materials on a DECmate III with French, German, and Spanish keyboards and software, will introduce those materials for student use in the fall. As the year progresses, in addition to their continuing development work, they will evaluate the materials students are using and will revise them as needed. They will also investigate foreign language **programs available commercially**.

In Art, the instructor is evaluating software for the Basic Design course. When appropriate software is purchased, the Basic Design students will complete at least one computer graphics project each semester. They will, for the present, use computers located in Media Service for their work.

The Reading instructor is investigating computer-enhanced reading instruction which would allow the instructor to spend more time with individual students. A computer-based speed reading course is another area under research.

Phase 2. The inquiry and decisions that will affect this phase will overlap the Phase 1 time segment.

Based on that inquiry and those decisions, Writing teachers will be requesting the purchase of pre-writing and writing software. They hope to have a variety of software available to assist students in the invention portion of the writing process.

The Communications **instructors** will want to move to a more sophisticated and commercially prepared computer managed learning and communication package. They will be working toward an intra-department computer networking system that will allow students to retrieve messages from their instructors from any DECmate in Beem Center.

Foreign Language instructors plan to use commercial computer assisted instruction as they find effective programs.

As students and the instructors become more adept at computer graphics, the Art department will need to add its own computers rather than have students leave the studio to use computers elsewhere.

As computer reading programs prove themselves valuable, the Reading instructor will need to add software and hardware to serve more students and to serve a wider range of skill levels.

Phase 3. Once the DECmates in Beem Center form a network, we will hope that other divisions and services will be available for an institutional network.

With an institutional network, a student writing a paper that required graphics could access Media Services or CAD or Lotus 1-2-3 or the Art department's computer graphic design system. Students and instructors would be able to access printers and the Copy Center from any computer on campus.

We look forward to detailing plans for phases three and four as we explore more computer applications.

PART V

EXPANDING TECHNOLOGY IN AGRICULTURE

Impact of Technology on Agriculture and Implications for NIACC

The economic and fiscal policy of the 70s and early 80s created uncertain economic conditions and continues to threaten the agricultural community with disaster. Businesses live and die by how well information is managed. For farmers and future farmers to survive and prosper, they must know how to manage financial and production information. **Because** information management is so critical to agri-business, farmers and agri-business persons who survive will be those who are prepared to manage. The current economic crisis in agriculture heightens the need for new tools to help agriculturists become effective managers.

With all of the overwhelming information available to farm families, one of the greatest challenges facing them in the next decade and beyond will be the use of this information in making good management decisions. Information management skills will determine farm and agri-business success. Information systems will reduce the risks and help increase profits by providing the information needed to make better management decisions.

As each business operation identifies its own information needs for marketing and financial information, price trends, new production management techniques, weather forecasts and trends, genetic engineering developments, and land and machinery markets, each, to remain current and accurate, must also continually update and change that information. The farmer or other ag-business person must carefully analyze all information to avoid snap judgments and bad decisions. By maintaining the information system and by using the information generated, businesses will be able to develop a decision-making process that will reduce their risks in all areas of farm management.

In an April 1986 report, the Iowa Farm Bureau Federation's Committee on Future Opportunities for Iowa Agriculture recommended that information management be an educational priority for agriculture.(1) However, despite that recommendation and despite warnings from the United States Congress' Office of Technology that farmers who fail to take advantage of computer technology may not survive, fewer than 10 percent of the nation's 600,000 full-time farmers own and make use of personal computers.(2) As a part of the solution to this problem, the NIACC Ag Department must provide instruction in the use of computer programs that allow the distribution and management of information.

Today, within informed successful agricultural circles, the personal computer is considered the tractor of the '80s. Typical full-time farmers must juggle a myriad of crop, livestock, and business records if they are to realize maximum yields, returns, and profits. Farmers must be sound financial managers in order to maintain cash flow. Many handle the production end of farming and business quite well but stumble when it comes to managing financial and production information.

Today's agri-career training involves education and experience to prepare students for more than 200 agricultural options. Former Secretary of Agriculture, John Block, recently stated: "We project a need for 59,000 ag graduates per year, and 13 percent of those needs will not be filled." (3) Opportunities exist, and we project a positive mood for the improvement of agriculture in the near future. Gary Mass of Agri-Careers predicts a severe shortage of young people with agricultural backgrounds to fill employment needs for the 1990s. (4)

It is imperative that we at NIACC, through updated instruction, provide the direction to **develop** tomorrow's agricultural leaders. Just as today's agri-business person cannot survive on yesterday's technology and production, today's institutions of learning cannot survive on outdated programs. The NIACC Ag Department plans to attack farm problems and students' educational needs with electronic information services and high-tech solutions. Hands-on experience with personal computers will be a vital part of those solutions.

The Ag Department is currently preparing high-tech programs that will have a profound influence on students entering farming and agri-business. These programs will provide information management experience, data base management skills, and decision-making assistance.

NIACC's goal is to turn Ag students on to information management by taking the tedium out of the task, in essence, educating students on ways to use vast amounts of information in making good decisions.

Computers have been found to be effective tools to motivate and to stimulate students in agriculture. With computers, students find the planning process easier and more interesting. After collecting accurate data, the student learns that the computer projection and analysis provides a reliable and accurate picture of what would happen to the agri-business if the plan were implemented. (5)

Our Proposal and Plans for Agriculture Management and Business

Present Status. Within the present Ag curriculum, a student may earn up to six semester hours of credit by taking three computer lab courses.

These courses serve as an introduction to computers for agricultural applications. Students learn to:

- Use data entry programs to analyze records and to make decisions
- Evaluate software programs
- Use filing systems
- Use word processing programs
- Use farm accounting programs
- Work with basic electronic spread sheets
- Utilize agri-business software

Other uses of the computer include instruction in areas of livestock ration analysis and construction, machinery management, ag energy, ag marketing, and finance. Students will also employ computer applications in making decisions concerning the farm operation. The number of students using the computers each semester is shown in the following table.

COMPUTER LAB ENROLLMENTS

	Spring 84	Spring 85	Fall 86	Spring 86	Summer
C-Lab I	)	)	4	8	*
C-Lab II	) 27	) 13	*	*	12
C-Lab III	)	)	7	5	*

In addition to students in the three lab courses, another 20 students enrolled in the Farm Corporation course will complete extensive hands-on computer experience as a major requirement of that course.

While we have made a strong start at introducing computer instruction into the Ag courses, we know that we must integrate computer applications into all of our instruction. Furthermore, we recognize that our students vary widely in their abilities and interests. If we are to meet the needs of such a range of students, we must construct complex learning strategies. Such strategies will require a comprehensive computer-assisted management system that will enable instructors to organize, integrate, and manage course objectives, materials, activities, and evaluation tools effectively and efficiently. As a part of that structure, instructors using the management system will be able to produce course outlines, data banks of information, student learning aids, test reviewer materials, and supplemental activities to enhance student learning.

The Ag department is already using one computer application that not only increases the instructional quality of the program but also is likely to have a direct and positive effect on student enrollment in the Ag program. This Midwest agriculture and education data-base computer service, Agri-Data Network, allows NIACC to access business information services, a communications service, an electronic purchasing system, ag terminology information, and ag education network, market information, charting service, and over 1,000 daily reports at a cost of only \$299 a year.

Currently, the department's hardware includes a recently purchased Compaq system, the 12 Apple IIe computers, and two printers in the McAllister Hall 110 computer lab.

Software purchased this year includes four major programs:

- \$349 1) Lotus 1-2-3 - a spreadsheet, data base, and graphics program
- \$299 2) Control Data Ag Check System - an accounting program with integrated crop and livestock modules
- \$320 3) Pioneer Decision aids - a service of 10 individual software programs used with Lotus 1-2-3 designed to aid in making crop, livestock, or financial decisions
- \$299 4) Agri-Data Service - a National agricultural data base plus system

Limitations of Apple IIe - Hardware and Software. The expanded Ag curriculum utilizes the powerful Lotus 1-2-3, Control Data's Crop and Livestock Accounting program, and Iowa State University's ag software. These programs will not run on the Apple IIe because they require MS-DOS.

Microcomputer Compatability. The Apple IIe will not operate most of the software currently being developed for two reasons: 1) it utilizes a different DOS and 2) it has an 8 bit CPU (Central Processing Unit).

The disk operating system (DOS) acts as an interpreter between the software and the computer hardware. Earlier systems used a DOS specific to each company's hardware, and usually one company's hardware and software were not interchangeable with that of another company. Later, many computer systems began using similar interpreters designed to be used with a compatible software language. MS-DOS by Microsoft Corp. has become today's standard interpreter linkage between hardware and software.

However, the Apple system uses Applesoft Basic or Integu Basic DOS, a slow, cumbersome system with insufficient capacity to operate complex programs such as Lotus 1-2-3. Although more complex programs can be run by data bank exchange or multiple disk interchanges, this process, besides being exceedingly slow, carries a high risk of error and information loss.

Just as the Apple IIe hardware lacks sophistication, so does its software, which is generally non-interchangeable. Because the hardware has insufficient memory, the system is unable to produce graphics. As a result, the Apple IIe software has less capacity and flexibility than Lotus 1-2-3. Lotus, in addition to its graphic capability, includes a high capacity for the organization of information within the spreadsheet. Furthermore, Lotus graphics allows the conversion of numbers and facts from the spreadsheet into visual images (graphics and charts). Finally, Lotus software, unlike Apple IIe software, is easily integrated and individualized to work with decision-aid programs and other software programs that allow flexible alteration for the user.

While the Apple IIe DOS lacks the capability and flexibility of contemporary systems, its central processing system (CPU) of 8 bits is also inadequate for today's powerful programs. The 16-bit CPU of the Compaq is far faster than the 8-bit of the Apple, has twice the memory, and has the capability for multi-user/multi-tasking operations.(6)

These contrasting features can be easily seen in the following chart.

Hardware		Software			
CPU	Computer	Operating System		Language	
		Native	Transportable	Native	Cobal Pascal
8 bit 6502	Apple IIe	DOS	With add on board	Basic & Fortran	With add on
16 bit 8088	Compaq	MS-DOS	CP/M 86	Basic & Fortran	Yes

While the current Apple software programs in our Ag library do not have the sophistication of those that run on MS-DOS 16-bit systems, they will continue to be useful for elementary instruction in basic computer operation and for simple decision-making tools based on "What if?" information. To maintain current instruction on existing software, we will need two Apple IIe computers and a printer from MH-110.

Equipment Selection. The following criteria were used in the selection of equipment:

- The equipment must be stand-alone with mainframe on-line capability.
- The hardware and software must have the potential for upgrading to avoid obsolescence.
- The hardware and software must provide student aids for ease in completing tasks: manuals, control keys, etc.
- The equipment must contribute to a modern ag-business-like environment.
- The software must have a proven record as an instructional tool that can provide multiple applications in the following areas: agri-business management and decision making, marketing instruction, farm records and analysis, accounting instruction, ration construction and analysis, spreadsheet mechanics, financial management instruction, student corporation projects, computer template applications, word processing for class reports, instructor data/base management, program electronic files, and data-base information system communications.

Using these criteria as guidelines, the Ag faculty compared five MS-DOS systems. The results of those comparisons follow in Table 1.

An evaluation of the systems revealed the Compaq system to be similar to the IBM PCXT with two exceptions: The Compaq is 30 percent faster and approximately \$425 less per unit than the IBM.

Based on our study, we recommend the purchase of the following equipment:

<u>EQUIPMENT</u>	<u>UNIT COST</u>	<u>TOTAL COST</u>
6 Compaq Deskpro II	\$1,850	\$11,100
6 Color Monitor	420	2,520
6 Cable	32	192
3 Brother printers	440	1,320
6 MS DOS	42	252
6 Lotus 1-2-3	347	2,082
TOTAL		\$17,466

The proposed request for six Compaq computer systems is designed to accommodate the current Agriculture programs and the existing students. As planned curriculum changes are implemented and Agriculture programs are expanded to meet the needs of new students, this equipment will be rigidly scheduled and expanded to serve both program and student needs.

Table 1
Comparison of MS-DOS Systems for Agri - Business

<u>Description</u>	<u>IBM</u>	<u>Tandy 1000</u>	<u>Panasonic</u>	<u>ATT</u>	<u>Compaq</u>
Service	Local	Minneapolis	Local	Local	Local
Support	Training	Limited	Training	Training	Training
Color monitor	Option	Included	No	Option	Option
Color graphics	Option	Included	No	Option	Included
Microprocessor	8088	8088	8088	8086	8086
Speed (Htz)	4.77	"High speed"	4.74	8	8.0
Portable	No	No	Yes	No	No
Printer cards included	No	Yes	No	No	Yes
Printer included	No	No	Yes	No	No
Approximate printer cost	\$400	\$600	Built-in	\$400	\$400
Software included	Start-up	Word process Spreadsheet Filer Telecommun. Calendar Mailer	Word process Spreadsheet Filer Reports/ Graphics	Start-up	Start-up

Curricular Applications. The Compaq MS-DOS computer system will complement and improve the teaching of courses in the agricultural curriculum and will facilitate farm record keeping, data-base information management, and farm decision-making management.

- A. **Farm Record Keeping:** The more powerful Compaq computer system will allow the use of more detailed and integrated farm accounting and enterprise analysis software programs. MS-DOS software programs such as Control Data's Ag Check can improve farm record keeping by integrating crop and livestock modules with the basic accounting system. Software available for the Apple system will generate only a fraction of the information analysis and would require a minimum of three separate programs.

A single entry in the AgCHEK system provides records by tax year and records by crop or marketing year. The accounting module organizes records for taxes and credit. The crop and livestock modules document cost of production by crop field or livestock group for improved marketing, cost control, and profit.

- B. **Data-Base Management:** Agri-Data Service will allow access to an outside data base and will be very useful for obtaining information and teaching students. However, in-house data base management will require additional software to implement a computer assisted instructional management system effectively. Some data base management can be accomplished through the use of Lotus 1-2-3.
- C. **Farm Management/Agri-Business Decision Making:** All of the newly acquired software for use on the Compaq system can be used to make better decisions regarding farm and agri-business operations. All of these programs can be used under flexible conditions, can be individualized to meet the needs of various students, and can be integrated into courses to meet several Ag department objectives.

Using this system, students will acquire the computer skills necessary for implementation of agricultural software. Currently, nearly all software uses MS-DOS. Specifically, Pioneer Hi-Bred and Lotus 1-2-3 have excellent sets of decision aids, spreadsheets, and information management programs that can move us toward our management goals and can assist students as they prepare to enter farming or other agri-businesses. Furthermore, this type of software can help us to control the college farming enterprises more accurately.

Students to be served. Based on current enrollment levels in Ag Management and Business programs, we project, as shown in Table 2, that, over the next three years, approximately 273 students will be served by the introduction of the MS-DOS systems. This number is expected to increase as program and curricular expansions are implemented.

TABLE 2

Current and Projected Use of MS-DOS Systems

Course	Current	Projected	
	86	87	88 89
Agriculture Day Programs [Credit]			
1. Farm Management	20	25	30 36
2. Ag Business	17	30	40 40
Agriculture Evening Classes [Non-Credit]			
1. Short Courses			12 20
Evening Course Offering [Credit]			
1. Computer Lab I			4 6
2. Computer Lab II			4 6
3. Computer Lab III			4 6
	37	55	104 114*

*Proposed curriculum changes may increase the number of courses requiring use of computers. Some of these courses may be offered as evening credit classes which have the potential for adding another 20 students.

Future Plans for Technology in Agriculture

Ag program curriculum changes now under consideration will impact the computer needs of the department very soon. The Advisory Committee has met and approved a general program change in direction of a general education core with second-year options to allow students to specialize in designated career areas.

These changes will require expanded instruction and emphasis in business, finance, and computer technology. Career technology programs such as Bio-Technology in Livestock and Crop Improvement will require data entry and research processing fundamentals; Marketing and Finance options will require data-base, graphics, and economic analysis capabilities with computer enhancement; and traditional programs of Farm Management and Agri-Business will require increased computer-aided decision-making skills.

The Compaq hardware will be able to handle the bulk of our software requirements as it is 100 percent IBM compatible. However, software will be reviewed and updated on a yearly basis to maintain our current technology and to anticipate future technology.

PART VI

UPDATING INSTRUCTIONAL SUPPORT SYSTEMS TECHNOLOGY

Impact of Technology on Instructional Support Systems and Implications for NIACC

A recent national study revealed that "the trend from traditional media to electronic media and from traditional materials to computer graphics processes is accelerating.

Computer graphic technologies first assist then gradually begin to displace conventional means of generating, modifying, converting, and distributing art, design, and drafting products. Computer graphics tends to compress the production cycle by absorbing many previously separate steps and by automating the transfer of information. Computer graphics tends to reduce the time, labor, materials, and other costs of producing art, design, or drafting products. . . .

Recent improvements in price performance have brought computer graphic systems within reach of medium-sized organizations."(1)

Colleges, such as Des Moines Area Community College and Iowa State University, are finding that video/computer projectors capitalize on the interactive flexibility of the computer to involve students or other audiences in all kinds of data, text, and graphics. A cable connection between the computer and the projector feeds the computer/terminal image to the projector which, in turn, flashes the image to the wall screen. Any change keyed into the computer keyboard effects a change in the projected image. Students, problem-solving teams, or large audiences may participate in making those changes and in revising data and decisions.

Computer-video projectors also enable the teacher or presenter to use video tapes as instructional support in large-group presentations. Without the large-screen projector, the audience is limited to the number of persons who can crowd around a standard-size television screen.

While visual materials enhance learning, ineffective, poor quality visuals may distract the learner and, in doing so, diminish the desired impact on the learner's mastery of the lesson objectives. Students/audiences have become so accustomed to sophisticated visual materials that anything less in the classroom or meeting hall detracts from the information and from the credibility of the teacher or presenter.

Presently, the production of most graphic materials at NIACC begins with rulers and pens. However, the use of rulers and pens demands artistic ability and a great deal of time; and still the product falls far short of the support systems that professional teachers and speakers require.

Today's professionals know the results of computer graphic systems, and they insist that such visuals be available to match and even enhance the quality of their presentations.

Furthermore, they have seen the results of the computer/video large-screen projector; and these professional educators want to be able to work through a computer application with many students at one time rather than making students wait for individual instruction on a small computer screen. In addition, they want to have large groups view a videotape rather than having small groups huddle around a small TV screen. These teachers and presenters realize that a computer/video large-screen projector turns the inefficient use of student and instructor time and effort into the efficient and more effective use of that time and effort.

All faculty and administrators understand the need for high-quality instruction and meeting materials, materials which may take a variety of forms, such as overhead transparencies, printed brochures and handouts, 35mm slides, videotapes, and large-screen projection of video and computer output.

At NIACC, staff members not only expect and demand outstanding print and audiovisual examples of hard copy forms (transparencies, handouts, and slides) but are increasingly requiring the projection of computer and video output in their classrooms and meetings. By linking the output of a micro-computer to a large-screen computer/video projection system, display of graphic items (charts, graphs, designs) can be projected directly to the wall screen. When a hard copy of the projection is needed, the data and graphics can be routed to the appropriate output device to produce a multi-color overhead transparency or paper copy, a 35mm color slide, or a videotape.

Our Proposal and Plans for Updating Graphics Technology

While our 1985-86 proposal for updating the instructional support systems covers both graphics production technology and large-screen computer/video projection technology, each of these areas will be addressed separately in the following sections.

Present Status. Currently, in the NIACC Media Lab, print and visual presentation materials are developed by hand through many labor-intensive, time-consuming steps. The following paragraphs and Figure 1 describe the present typical production procedure.

A faculty member or administrator, requesting a graphic product, generates data and puts that data into written form.

A member of Media Services staff sketches the desired page layout design by hand from the raw data and text content.

That person must then again translate the text into typed or typeset output. (Typesetting on campus is presently done on a one-character-at-a-time compositor.) After proofing the copy and attaching adhesive, the technician then cuts the copy and pastes the desired page design onto layout paper.

Next, Media Services develops designs, graphs, and illustrates by freehand drawing, photo copying, tracing, measuring, ruling, and inking. Referring to the rough sketch, the technician adds these drawings to the text paste-up. Both the Media Services staff and the originator again proof the paste-up. All data and design changes requested during proofing require the Media Services staff to redraw and repaste the revised portions of the design.

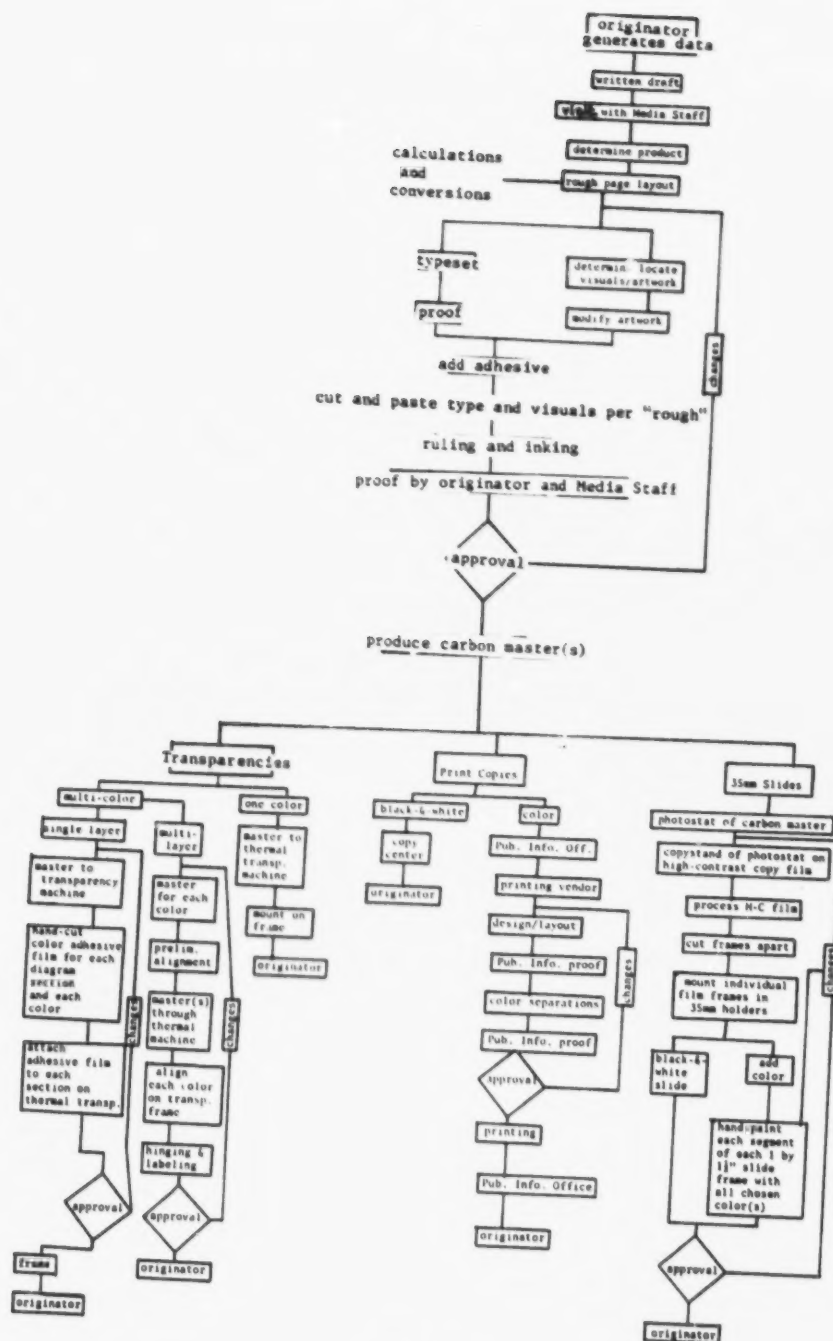


Figure 1
Current Graphics Design Procedure

BEST COPY AVAILABLE

When all items are finished and have the approval of the originator, the technician produces the carbon master. The carbon master becomes the base for one or more of three product procedures: 1) print copies, 2) overhead transparencies, 3) slides.

1. Print copies move through different steps depending on whether the design print is to be in black or in color(s).
 - a. If the ~~print copies are to~~ be black printed on white or colored ~~stock~~, the carbon master is simply sent to the Copy Center. When the copies are made, the Copy Center forwards them to the originator.
 - b. However, if the print copies are to be printed in color(s), the carbon master goes to the Public Information Office and from there to an outside printing ~~vendor(s)~~ where the colors are separated and a plate is made. A representative of the Public Information Office must then proof the plate copy. If the plate is unacceptable, the procedure must be repeated and the corrections made. When the plate is acceptable, the print copies are made and returned to the Public Information Office.
2. Transparencies ~~also~~ follow different steps when the design is one-color and when the design is multi-color.
 - a. When the transparency design is in one color, the carbon master is run through the thermal transparency machine with a transparency film that produces the desired color. After the transparency is mounted on a frame, it is sent to the originator.
 - b. When the design is to be multi-color, two options exist for adding those colors.
 - 1) The first is ~~to~~ run the carbon master through the thermal transparency machine to make a black design on a clear transparency. Then, adhesive film in each desired color is hand cut and each piece is painstakingly attached to the appropriate area. After the originator has proofed and approved the transparency, it is complete.
 - 2) The second is to make individual layouts of each content area and to produce separate carbon masters for each layout. These masters are then run through the thermal transparency machine on transparencies that produce the individual colors. These transparencies are then aligned to form a multi-layer, hinged transparency allowing sequential revelation during the presentation. The mounted transparencies are then ready for the originator.

3) Slide production also may take one of two paths.

- a) If the slide is to be in black and white, the carbon master is photographed and printed on a slick-finish paper. Then, this print is placed on the copystand and is photographed on 35mm high-contrast copy film. After the film is processed, the individual slides must be cut apart and mounted by hand. They are then ready for the originator's use.
- b) If, however, the slide design is to be in color, another tedious step is added after the slide is mounted. That step involves the Media Services staff in painting each segment of the design by hand directly on the 1 x 1 1/2-inch slide. Finally, the slides are sent to the originator.

Of course, a moderately-detailed pie chart or bar graph consumes even more staff time for the conversion of data to percentages and then to line-length equivalents or degrees-of-arc to ensure that the graphic representation of the data is accurate. Furthermore, a project may be in the final steps of production when the originator receives new data that affects the design or the originator decides to change the presentation of the data. The project must, then, begin anew.

Daily, the demand for an expanding variety of high-quality media materials increases. However, because of the labor-intensive methods that we are forced to use and because so many of the visual-aid requests require extensive layout work, the number of projects we can accomplish in a semester depends on the number of support personnel and the amount of experience and training they have had.

The effect of these restraints on layout production is evident in the following records of projects requiring layout over the past few years. During the 1980 through 1984 years, the support staff remained stable and the product requests increased by over 400 percent. In 1985, the most experienced support person resigned and graphic production, totally dependent on hands-on work, skidded to a three-year low.

During late 1985 and early 1986, while a new member of the staff was learning and developing layout skills, the production numbers have started to increase rapidly again.

Instructors and the willing staff of Media Services decry the constraints imposed by limitations resulting from our labor-intensive layout methods.

INCREASES IN THREE MEDIA PRODUCTION SERVICES

YEAR	DESIGN LAYOUT	SIGNS	EQUIPMENT DELIVERY
1980	0	526	700
1981	50	1510	1511
1982	223	1759	1520
1983	431	1047	1672
1984	372	1148	2053
1985	224	398	2360

From the above table, it is apparent that layout is only one of the responsibilities of the Media Services staff.

Layout is always only a part of a process for creating transparencies, slides, and signs. As shown in the following figures, the number of signs produced has increased dramatically. Sign production, another labor-intensive process, also consumes staff time. The data on signs reflects the same time and personnel involvement in processes that do not incorporate technology.

At the same time that Media Services staff members are creating media products to answer a growing number of staff requests, they have a responsibility not only for maintenance, checkout, delivery, and return of all audio-visual equipment on and off campus but also for development of staff members' skills in equipment use. As shown in the table above, the delivery and return portion of those responsibilities continues to mount.

The demands by NIACC staff for graphic products have exhausted the resources and capabilities of the present Media Services technology. On several occasions, because of our outdated processes, we have been unable to meet deadlines, have been unable to accept projects, and have had to resort to using outside vendors.

While willing and competent, the Media Services staff is unable to handle any further increase in requests for graphics. Even to meet current demands, we must have a computer graphics system; or we will be forced to limit or delay production of graphic materials requested by instructors.

Desired Status. With highly sophisticated hardware and software, NIACC, using existing staff, could enjoy production of more polished and consistent graphic output; an increase in that output; more artistic and professional-looking development and manipulation of data elements; a reduction in duplication of data, effort, and time; and a more efficient turn-around time.

The multiplicity of steps in the present procedure would become the simplicity of the following procedure (See Figure 2). A member of the faculty or administration would request a visual product from Media Services and would, at the same time, give the access location of the data in the computer network. The Media Services computer operator would retrieve and manipulate the data into design, text, and color directly on the computer. As the originator proofs the graphic on the computer or in a hard copy, the operator makes any desired revisions. With the originator's approval of the graphic design, the operator touches a key designating the output product. The product, ready for use, appears in the desired colors or black and white.

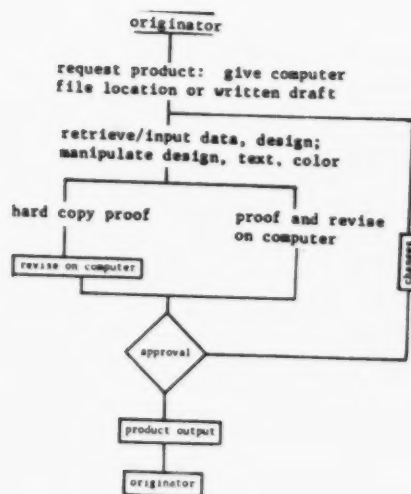


Figure 2
Proposed Graphic Design Procedure

Alternative Solutions. NIACC Media Services can, with varying degrees of output quality, production/personnel time, and expense, accomplish production of graphics materials in any one of several ways.

First, we can continue with the current labor-intensive, time-consuming system. However, the amount of time and staff required are not adequate to meet staff requests for overhead transparencies, 2 x 2 slides, and video productions.

A second alternative, an option already in use, is to send materials to an outside vendor for production. Although most frequently used by the Public Information Office presently for the production of layouts for print media, such as posters, brochures, and catalogs, this alternative could extend to other departments. Within the community and the state, services exist for creating these printing master "paste-ups," as well as overhead transparencies and/or 35mm color slides from printed or computer-generated data. The time from start to finish for vendor service ranges from 5 to 14 days. Additional costs are incurred for postage/shipping or telephone/computer transmission. With this type of production, loss of flexibility makes it impossible to accommodate last-minute changes in data. In addition, a very complete design of the desired output must accompany the material when it is submitted. Of course, this mode of production still demands campus staff time for the development of this first stage of production.

Production of graphics by a personal computer is a third option. This option would include hardware, such as an Apple II series, a Macintosh, or an IBM-PC, and software, such as The Print Shop, MacPaint/MacWrite/MacDraw, Lotus 1-2-3, or more sophisticated graphics-generating programs. While production of basic graphic types is certainly faster with a micro-computer than with human hands, the sophistication of the output is quite limited.(2) Although more original drawing work can usually be done at the computer than by hand, sophistication and flexibility still depend on the memory size of the personal computer, the capacity of the software, and the capabilities of the operator. Furthermore, this type of computer configuration does not output a completed transparency or 35mm slide. Because only the input and "number crunching" are computerized, the output steps of creating the transparency or slide and adding color must still be done by hand.

The fourth graphics production option is based on a mainframe computer. Software programs on a mainframe computer would generate graphics and feed them to appropriate output devices. Currently available mainframe graphics software packages, intended for very large multi-user organizations, use extensive amounts of memory/storage capacity.(3) Moreover, they are not as easy to use as our needs demand. While we currently have a mainframe computer and some terminals on which several brands of graphics can operate, the present mainframe system graphics software has tended to be user-frustrating, slow, and voracious in memory and storage needs. Furthermore, data manipulation is difficult; and output is very unsophisticated.

A fifth possible in-house graphic production system is a stand-alone, large memory micro-computer that would both feed appropriate output devices and network with other micro- and/or mainframe computers.(4) These systems allow sophisticated data manipulation and easy access to data on other computers' files. Because these systems provide for design and revision and for black and

white and color and for full screen display and product output, they offer the flexibility and quality that we need. In addition to their not using mainframe computer time and storage, these systems are comparatively easy to learn and, even more important, to use. With such a system, because the system is reasonably easy to learn and because the system does so much of the detail work, we would lessen the down-time that currently occurs when we have a change of staff. Moreover, when we outlined our applications to the experienced staff members at Grinnell College, a mainframe user, they recommended that we commit to a large memory micro-computer system with state-of-the-art software and peripherals.

Equipment Selection. A review of current graphics applications on campus revealed three major areas of immediate graphic needs: graphics design, type-setting, and video production. After establishing the areas of need, the Media Services Coordinator participated in media conferences, read periodical and journal articles, developed a list of criteria on which to judge the available systems, and considered product information from and demonstrations by many vendors.

After extensive examination of NIACC's needs and of the various graphic production options, we affirm that a large memory micro-computer system would be the wisest investment for NIACC. From the available systems, four had characteristics that met some or all of the criteria and, therefore, merited careful scrutiny. Table 1 shows the evaluations of those five systems based on the criteria listed in the left column.

The Invion system, designed primarily for video interface, does not have print quality equal to our needs. In addition, the company is just developing much of the software, the interfaces, and the output devices. Therefore, they cannot meet our criteria.

While Artronics has a powerful, creative computer, this company offers limited output devices, its staff is limited and overextended. They, too, are unable to meet the criteria.

Autographix, which is more expensive than the others, also has few output devices and is less powerful and flexible than at least two of the other vendors' systems. Autographix would not suit our purposes.

Because many of the Wasatch company's output devices are still in the developmental stage and will not be available for at least six months, this vendor cannot furnish the kind of system NIACC needs. However, this company may be a future supplier.

One company, Acticon, can provide a graphics system that has the capability to do software creation and manipulation and the appropriate output devices and connections.

Therefore, because the Acticon system meets our criteria, as shown in Table 1, we recommend the purchase of the following equipment:

Quantity	Item	Cost
1	ACTICON Computer Graphics System with IBM Compatible Computer, Monitor, and Software	\$14,880
1	Page Layout Software with Laserwriter	7,450
1	Videoscan Frame Grabber with Software	850
1	Matrix Thermal Printer	6,220
1	Matrix QVP Card	2,195
1	PC Slide Imaging Center	1,995
TOTAL		\$33,590

Curricular Applications. As we update instructional support systems technology, we update instruction; for graphic design products yield a myriad of instructional applications. Several examples will serve to show the scope of applications in the curricula of Arts and Sciences, Careers, and Community Services.

A Government instructor has a transparency of the present organization of the state government. As the Senate and House discuss reorganization, he wants to develop overlays of each proposed change. He would like to have a master that could be copied and manipulated to show the proposed structure as it relates to the present structure.

Of course, the information is only available in the morning paper; and he needs to have this work done quickly each morning before his first class.

Again in the Arts and Sciences Division, a Computer instructor needs a special and unusual size grid to match a particular typewriter's letter and line spacing in order to enable her to prepare examples of programs that can be translated into transparencies. Using these transparencies will help students understand the programming skills on which they are working.

Often, Careers Division graphic projects involve processes. The Refrigeration-Air Conditioning instructor has located a particularly fine drawing of the refrigeration cycle. He would like to have a full-color transparency of the drawing. In order to provide such a sophisticated work, the drawing will need to be redrawn in the components according to color. This transparency would provide another approach to students' understanding of this critical cycle.

Table 1
Comparison of Computer Graphic Systems

	Imation 2881	Artimaze	Autodesk 288	Hamamichi PC 1024	Action
Output Devices					
Plotter	No-Ink Jet	Yes & Ink Jet	Dot Matrix Printer Incl.		
Color Thermal Printer	Included	Yes			
Laser/Electrostatic Printer	Laser Available	External Source	Option Available	External Source	Included
Phototypesetter			Option Available	External Source	Laser Included
Video	Future Plans	Available	Option Available	Available Option	Included
Multi-Tasking (On/Processing) Characteristics			Yes		Yes
Full-Screen Monitor	Yes	Included	Yes	Yes	Yes
High-Resolution Color	Yes	Included	Yes	Yes	Yes
Simultaneous Color Variety	250,000	256	64	256	256
2-D and 3-D Display	From External Software	Yes	Yes	Yes	Yes
Range of Charts and Graphs	All Specified	All Specified	All Specified	Being Upgraded	All Specified
Special Effects	No	Yes	Yes	Being Upgraded	Yes
Anti-Aliasing	Yes	Yes	Yes	Yes	Yes
Texture/Surface Mapping	External Source	Yes	Yes	Yes	Yes
Bitmapped	Yes	Included	Included	Included	Included
Digitizing/Animation	Future	Avail. w/Options	Option With Video	Available 4/86	Included
Frame Grab/Zoom		Available	Optional	Available 4/86	Included
Genlock		Available	Optional	Available 4/86	Included
RGB/NTSC Input & Output	Output Only	Available Option	Optional	Available 4/86	Yes
Grid Overlay		Yes	Yes	Yes	Yes
Multiple Simultaneous Use (color, design, text)		Yes	Yes	Yes	Yes
Library and User-defined Charts		Yes	Yes	Yes	Yes
Library and User-defined Fonts	User-Planned	Yes	Yes	Yes	Yes
Merging		Yes	Yes	Yes	Yes
Range of Fonts & Point Sizes		Yes	Yes	Yes	Yes
Actual Screen Representation	External Software	6-17	5	12 +	20 +
Multiple Output Connections		Yes	Yes	Yes	Yes
Networking		Yes	Options Available	Yes	Yes
Document Backup	External Software	Yes	Yes	To Hard Disk	Yes
Proprietary Software	Yes	Yes	To Hard Disk	To Hard Disk	To Hard Disk
Performance on Sample Problems			Yes	Yes	No
Speed of Production	Not Seen	8-16 Min. Ea.	Depends on Options	20 Sec. to Slide	20-120 Sec. to Thermal
Sophistication of Output	Good	Excellent	Excellent	Excellent	Excellent
Quality of Output	Not as Specified	Excellent	Excellent	Excellent	Excellent
Vendor Support					
Installation	Not Necessary	Included	Included		Included
Training	Optional	2 Days Incl.	Included	Approx. 100 hrs.	Included
Periodic Checks	Help Hotline		Not Outlined	Phone Modem to Mfr.	Call Dealer
Service	Manuals Included	8 Service Center	Maint. Agree-\$6000+/yr	Maint. Contract	Hotline + Dealer Warranty
Updates	Projected 1/87	Ship to Mfr.	Available Thru Dealer	Incl. w/Maint. Contract	Avail. w/Dealer Notif.
Qualified Users			Tex A&M, Cornell, MIT		College of DuPage, IL, Am. Airlines, New Orient Media
Price Range	\$20651	\$77125 + Periph.	\$67200 - 96000 +	\$13965 - 14365. Plus Peripherals or \$18900 w/ Computer. Plus Peripherals	\$57275

Optometric students are studying the development of cataracts, and their instructor wants to show the changes as the condition progresses. A multi-layered transparency would serve as excellent visual support for a process that words can only partially convey.

Community Services needs a carbon master of a special design and text for brochures for course offerings. To ensure their making a good impression on the public, they want the text typeset.

In addition to direct instructional support, Media Services prepares pie charts, graphs, tables, and other visuals for presentations made by administrators and by counselors to inform the public about NIACC and to recruit students.

Students to be Served. Because Media Services serves the entire College effort, it serves every student who enrolls in a course, workshop, or seminar in which the instructor uses media support. Most instructors at NIACC use several kinds of media support. Furthermore, Media Services serves potential NIACC students in the work done through the recruiters.

Location and Layout. The graphics system will be located in the mid-section of the east wing of the Media Lab. This area is already dedicated to the work we are presently able to do in graphics; it is a particularly suitable location because of available outlets and because of the low-traffic volume in that section. The planned configuration is shown in Figure 3.

Our Proposal and Plans for Projection Technology

Present Status. NIACC has just one computer/video large-screen projector. While projection from this equipment makes a strong statement in very large areas like Beem Forum, its design is not as suitable for smaller areas. Regardless, the on-campus demands for this one projector test the number of available time slots. Furthermore, this projector will begin to suffer from excessive moves.

Instructors of computer applications are thwarted in their teaching because they must work through the procedures for a particular application with only a few students at a time. A computer large-screen projector would allow the instructor, working at a keyboard, to teach the procedures as the students participate in response to the image of the computer screen on the large wall screen. Likewise, a Communication Skills instructor, planning to show the three videotapes of "Writers Writing," must split each class into small groups around TV screens. As a result, the instructor cannot stop the tape(s) to discuss elements of the video with the students. Therefore, much of the effectiveness of the presentation is lost.

Instructors of off-campus courses continue to express frustration at their inability to use videotapes for their classes. Although NIACC has invested in some very effective public relations and recruiting tapes, recruiters do not have access to portable video large screen projectors. In addition, outside agencies renting NIACC facilities frequently require computer/video large-screen projection. Of course, Media Services, with only one projector, must deny all but one request for a particular time period. While a TV screen may meet the needs of a small group viewing material of a general nature, a TV

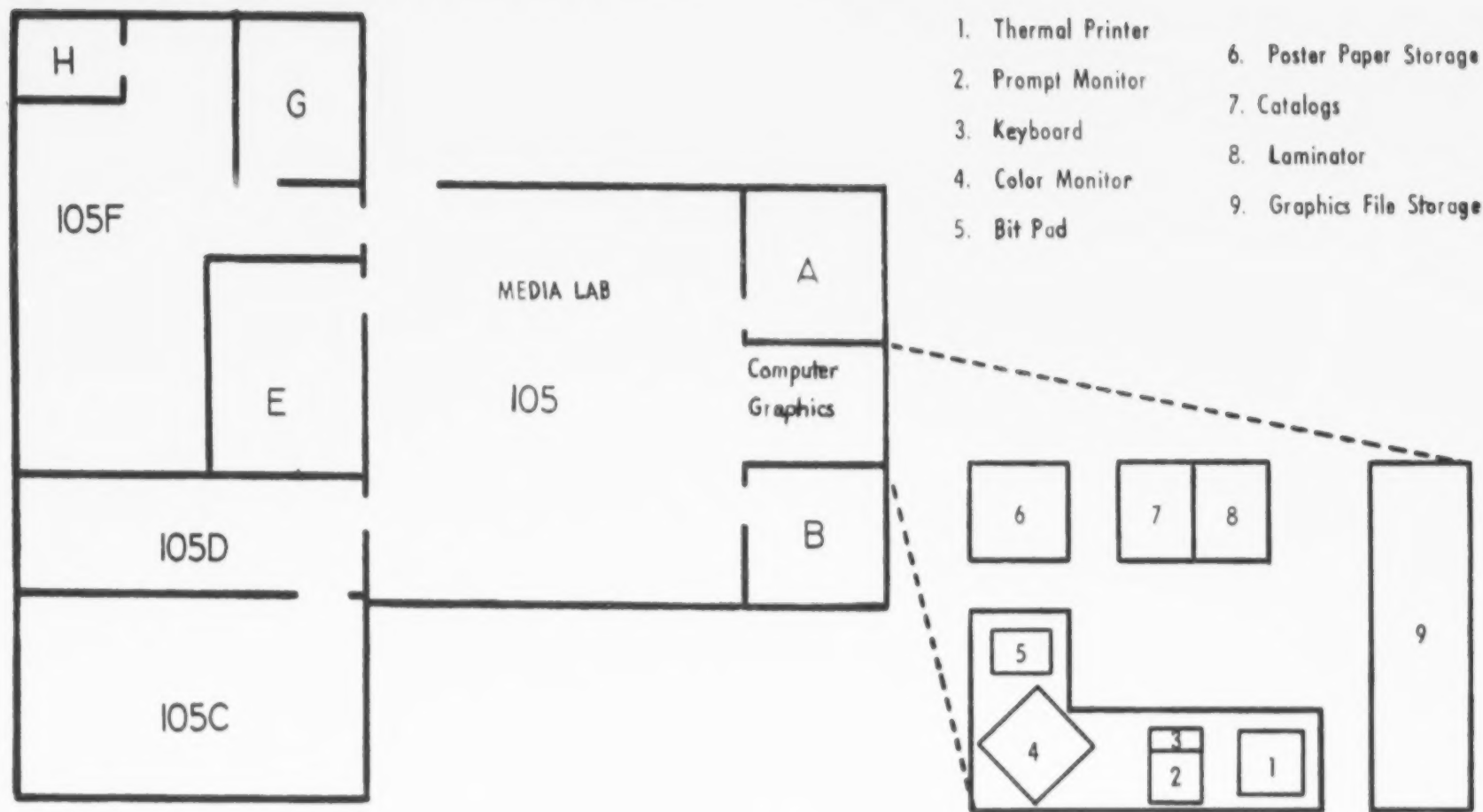


Figure 3
Proposed Layout of Graphics Production System

screen obviously cannot serve a large audience, nor can it adequately show detailed or statistical material.

If, as seems probable, another satellite drop is added, Media Services will receive even more requests for video projection for large groups. Presently, those requests could not be satisfied.

Desired Status. We believe that NIACC instructors, coaches, recruiters, and presenters should have reasonable access to computer/video large screen projectors. Therefore, permanently-mounted, movable, and portable projectors should be available for service in a variety of settings.

Certainly, computer instructors in the IBM lab should have continuous use of a computer large-screen projector. Both on-campus and off-campus instructors, coaches, recruiters, and presenters should be able to reserve a movable or a portable computer/video large-screen projector.

All presenters and their audiences in Beem Forum should always have computer/video large-screen projection available. Persons reserving meeting rooms in the Careers Building and Activity Center or the Board Room in the Administration Building should also be able to reserve large-screen projectors.

With this equipment, NIACC will move forward in providing the contemporary instructional tools that the faculty and the community have properly come to expect.

Equipment Selection. A close monitoring of requests for computer and video large screen projectors showed an urgent need for additional equipment with different capabilities than our present projector has.

Again, the Media Services Staff Coordinator searched periodical and journal literature, read product literature, attended conferences and demonstrations, and talked to users and vendors. This information was added to knowledge gained through nearly two years of experience with the present projector.

As a result of this research, we propose that NIACC purchase two computer/video large screen projectors (composite and non-composite), and two portable computer/video large screen projectors (composite) and a video-cassette recorder for each projector.

Criteria used in judging the vendors' offerings are given in the left column of Table 2.

The standard Electrohome EDP58, while the best of the monochrome projectors, will not project full-color; so it does not meet our requirements.

Another standard model, the Vivid/Limelight, has a green screen only and does not meet our needs.

The Sony 1020Q, a standard model, provides full-color, offers good illumination, is easy to set up, and can be moved from room to room on a cart. It will also connect to both computer and video (non-composite and composite).

Table 2
Comparison of Computer/Video Projectors

	Sony FP-62	Sony 10200	Vivid Limelight	Electrohome EDP-58	Panasonic PT-101
<u>Vendor Support</u>					
<u>Types</u>					
Green screen	No	No	Yes	Yes	No
Full color	Yes	Yes	No	No	Yes
<u>Input/Output</u>					
Computer	Possible	Yes	Yes	Yes	Optional
Videotape	Yes	Yes	No	No	Yes
Video Camera	No	Yes	No	No	Yes
RGB (non-comp)	No	Yes	No	No	Optional
NTSC (comp)	Yes	Yes	No	No	Yes
Other	VHF/UHF/CATV	PAL/SECAM	Converter for Composite	-	-
<u>Resolution</u>	-	600 lines-RGB 400 lines-NTSC	1300 lines	1300 lines	800 lines-RGB 550 lines-NTSC
<u>Built-In Tuner</u>	Yes	No	No	No	No
<u>Light Output</u>	-	65 ft.lambert	115 ft.lambert	-	400 Lumens Peak
<u>Picture Size</u>	3'x4" diag.	up to 100"diag.	5' diag.	6' diag.	50-85" diag.
<u>Distance from Screen</u>	-	132.75"	-	-	?
<u>Portable/Movable</u>	Yes	Yes	Yes	No	Yes
<u>Fixed-Mount</u>	Not Recommended	Yes	Possible	Pedestal, ceiling or Desk	Yes
<u>Set-Up Needed</u>					
Grid Alignment	No	Yes	No	?	Yes
Lens Alignment	No	Yes	No	?	Yes
Other	Motor Driven Focus	Test Pattern	Focus, brightness, contrast, sharpness	Keystone	-
<u>Audio Connections</u>	In & Out	Yes	No	No	Yes
<u>Internal Speaker</u>	Yes	Yes	No	No	Yes
<u>Weight</u>	31 lbs.	59 lbs.	25 lbs.	45 lbs.	72.6 lbs.
<u>Carrying Case</u>	Handle on Unit	Available	Handle on Unit	No	Optional

The only available portable, the Sony FP62, provides adequate illumination for its size and purpose. This portable projects video only.

As is evident in Table 2, the two Sony projectors are the only ones that meet the criteria. We, therefore, recommend the purchase of the following equipment:

Quantity	Item	Cost
2	Sony 1020Q1 Full-Color Classroom-Size Video/Computer Projector @ \$5,850	\$11,700
2	Panasonic AG2200 Videocassette Player/Recorder @ \$800	1,600
2	Sony FP-62 Portable Video Projector @ \$2,000	4,000
2	Panasonic AG2400 Portable Videocassette Player/Recorder with Battery and AC Adapter @ \$950.	1,900
TOTAL		\$19,200

Curricular Applications. Probably every student in NIACC and many of the persons who attend conferences and programs on campus will enjoy the benefits of this equipment.

Surely every student who takes a computer course will depend on large-screen projections to learn procedures for computer applications. History students will be able to view "War: A Commentary" as a class or larger group. Communication Skills instructors will use large-screen projectors to interface with DECmates to teach word processing and revision with Writer's Workbench. Government students in large-group sessions will be able to take notes in a suitable setting rather than elbow to elbow around a TV monitor. Students in athletic programs will benefit from examination of plays on a large screen. Even potential students will benefit from large-screen projections used in recruiting presentations. Conference groups will be able to study data without moving into small groups huddled around TV screens.

Layout and Location. Our present computer/video large screen projector will be permanently mounted in Beem Forum where its projection capacity is essential. The computer large screen projector will be assigned primarily to McAllister 210, the IBM lab. One of the computer/video projectors will be placed in Careers 106 to 109, rooms used for Community Services classes, relicensure classes, and satellite teleconferences; one will be placed in Activity Center 104 A and B, where both meetings and classes are held. These two will be moved to the Board Room or to other rooms as needed. The two portables will be checked out from Media Services for classroom use, athletic events and practices, off-campus classes, recruitment, and off-campus presentations. Figures 4 through 9 show the location of the projectors in the rooms.

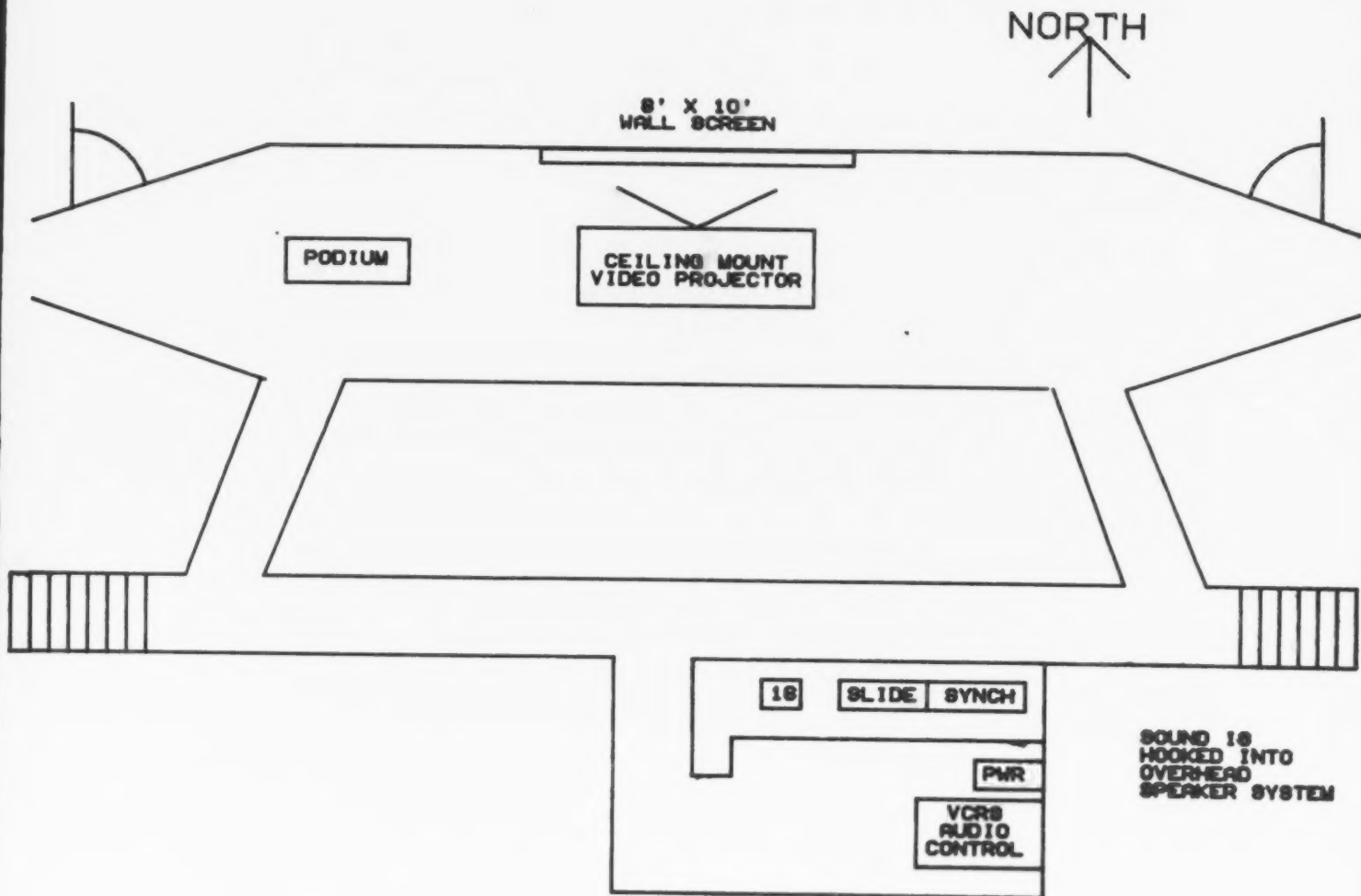


Figure 4
Proposed Location in Beem Forum

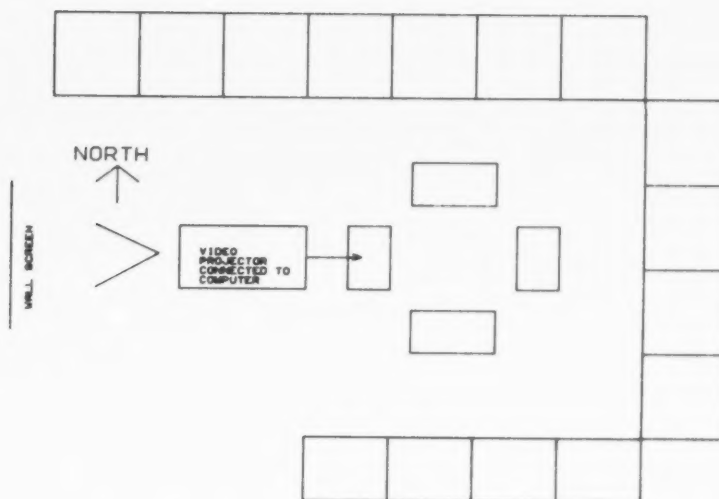


Figure 5
Proposed Location in MH 210

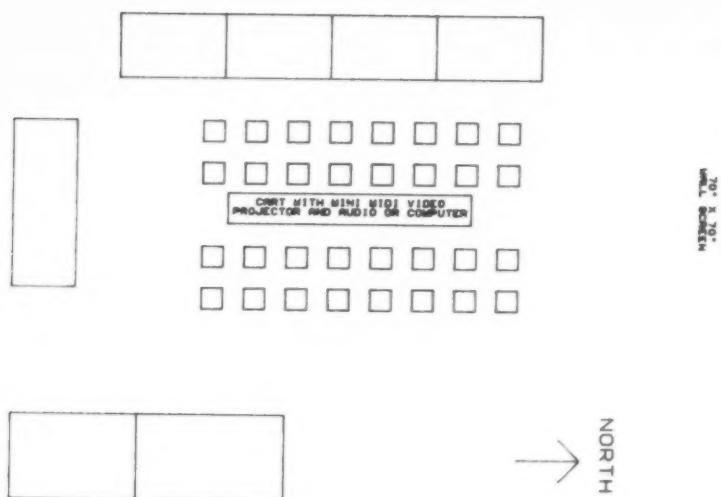


Figure 6
Proposed Location in MH 110

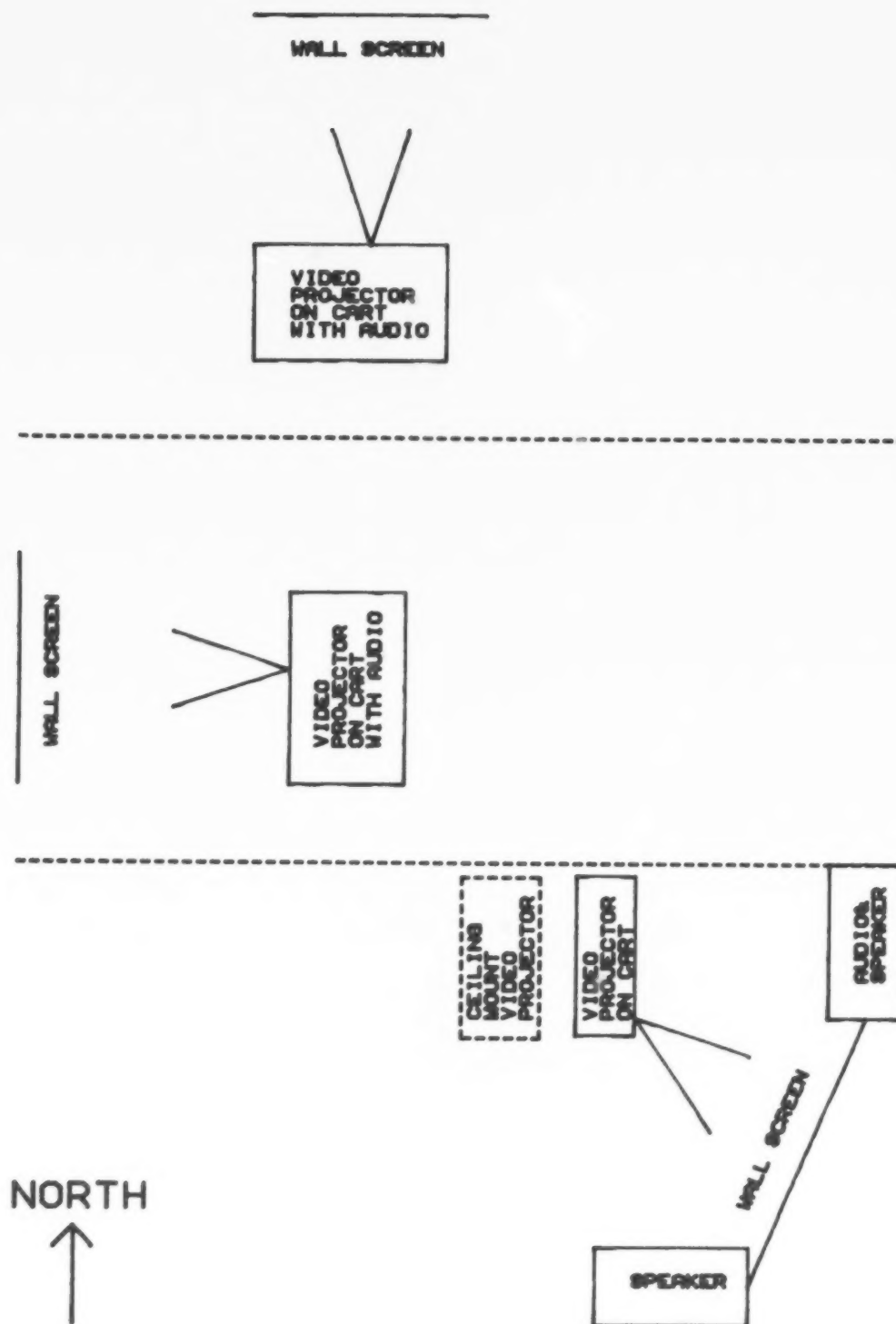


Figure 7

Proposed Location in CB 106-107-109

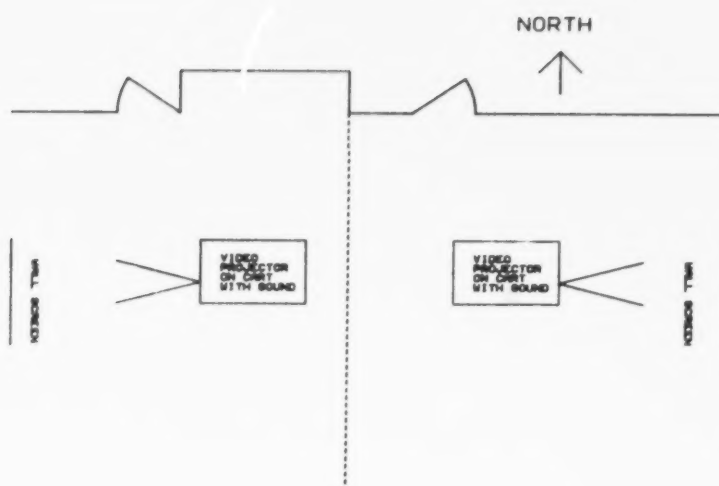


Figure 8

Proposed Location in AC 104A&B

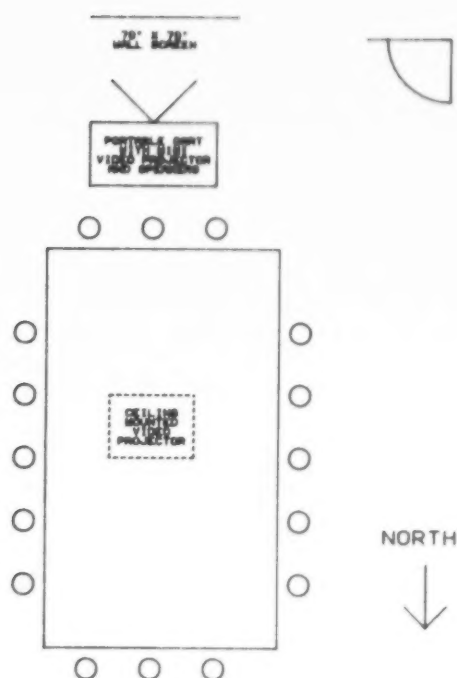


Figure 9

Proposed Location in AB 100

Future Plans in Graphics Production and Projection Technology

With the growing importance of media materials, we will continue to work toward extending all instructional areas accessibility to media through our greater use of technology.

Graphics Production Technology. In our present plans, we have confined our computer output capability to overhead transparencies. As instructors and presenters realize the quality of graphic design products available through this high technology system and the speed with which the system produces those products, they will want to heighten the quality and timeliness of their presentations with more of these supports. Moreover, they will develop more and more applications and will require an even wider variety of visual modes. Experience shows that easy access to audio and video support services begets instructional creativity.

Of course, the reorganization and revitalization of the Career programs will certainly increase the need for visual products to support instruction in these high tech fields.

Two requests serve as examples of the kinds of video productions instructors already need and want. In the study of the internal combustion engine, the automotive instructors want students to see the action of the pistons and camshaft movement and to see evidence of the importance of timing in the combustion cycle. To accomplish these goals, they need an animated video program. A Community Services instructor needs full-color transparencies of photographs of bandaging procedures for various injuries and would like an animated video program to help students perfect their skills as they take the Emergency Medical Technician course.

Therefore, the computer system that we have proposed has the potential for a far wider range of outputs. Our future plans are directed toward incorporating those video dimensions into NIACC's total Media Services capability.

Graphics Phase 1. In this phase, we will purchase, install, and master the computer design capability outlined in this proposal. Because this system will only output overhead transparencies (the product for which we receive the greatest number of requests), we will, during this time, research programs and peripherals that will enable us to create products for which we have many requests but which we are unable to produce or which we produce with uneconomical "hands-on" methods. We have delayed these decisions for later phases to allow us to study the changes that will allow maximum linking with studio video equipment.

Graphics Phase 2. Once we have mastered the initial computer-graphics system, we must work to capitalize on the other capabilities of this system. Those capabilities include animation of computer generated images. Both animation and live video tape productions require the same technical support equipment. In order to produce professional quality animated and live video tapes, we must update our 12-year-old studio and video control equipment and acquire computer boards and software to drive the video animation and video recording capabilities. This upgraded system will also enable us to create titles and graphics for video productions.

Graphics Phase 3. In phase 3, we will add a high-resolution film recorder (slides) and complete networking of the Media Services computers. In addition we will continue to analyze the system and to expand its uses.

Graphics Phase 4. By this time, we will have achieved networking of the Media Services computers and equipment. We hope that by then other units of the College will have developed intra-unit networks that we will be able to access directly. In doing so, we will have reached a state-of-the-art Media Services system, and we will look to providing high-intensity in-service programs to help the College staff understand and use all of the services that we will be able to provide.

Projection Technology. As students and audiences find that these projections make learning easier, instructors and speakers will employ computer and video projections with increasing frequency. Therefore, we have planned for this growth through three phases.

Projection Phase 1. In this phase, we will purchase the equipment listed in this proposal and will publicize its availability.

Projection Phase 2. Of course, two portable projectors will just whet the educational appetites of instructors and students eager to learn and to relate and apply learning to life through the visual dimension of computer and video projections on a large screen. Therefore, in this phase, we will add portable projectors for on- and off-campus classroom use.

Projection Phase 3. In the next phase, we will add a computer/video projector for the Board Room. Then, we will be able to mount the two computer/video large-screen projectors (Phase 1) in CB 106 - 109 and AC 104 A and B.

PART VII

SUMMARY

Summary

The increasing use of computer-based contemporary technology by agriculture, business, industry, and postsecondary education requires a continuous investment in updating equipment and people's knowledge and skills. In Area II, as across the nation, farmers, manufacturers, and businesses of all kinds and sizes are expanding their use of contemporary technology. Continuous updating is essential for survival in increasingly competitive markets.

NIACC's contemporary technology initiative recognizes that we, too, must continuously update our equipment and staff to remain competitive in our postsecondary education market. We have an ongoing obligation to prepare students to live successfully in a technological society.

As a next step toward meeting this obligation, we plan selected equipment investments in the areas of Manufacturing Technology, Business, Humanities, Agriculture, and Instructional Support.

These investments will enable us to start implementation of Career program modernization in manufacturing technology, to expand access to state-of-the-art equipment and procedures in Business, Humanities, and Agriculture, and to enhance the quality and efficiency of instructional support. Consequently, implementation of this updated proposal will enable NIACC to deliver high quality, up-to-date instruction which will prepare North Iowans for productive lives in tomorrow's world.

Respectfully submitted,

THE CONTEMPORARY TECHNOLOGY TASK FORCE
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PART VIII

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